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NOTES ON THE ATLANTA MINE AREA, ATLANTA MINING DISTRICT, LINCOLN COUNTY, NEVADA BY HARRY E. NELSON, REGISTERED GEOLOGICAL ENGINEER, NEVADA REGISTRATION NO. 891, DATED SEPTEMBER 14, 1965

INTRODUCTION: This report has been prepared for Deep Sand Petro-Energy Developments, Inc., P. O. Box 208, Pioche, Nevada, and Eugene Jordan Associates, P. O. Box 1616, Oklahoma City, Oklahoma.

Location and Accessibility:

The Atlanta Mining District, located in eastern Nevada, near the Utah border, is about 75 miles southeast of Ely, Nevada and about 35 airline miles north of Pioche, Nevada.

Access is by 21 miles of county maintained gravel road from U. S. Highway No. 93 at Pony Springs, some 29 miles north of Pioche, Nevada.

The closest railroad is that of the Union Pacific Railroad at Pioche, Nevada. This railroad spur from the main Union Pacific line at Caliente, Nevada services the mines in the Pioche District.

A landing strip about three miles north of the Atlanta Mine has been graded; it has two runways, one about 5,300 feet in length while the second is about 4,000 feet in length.

The Atlanta Mining District is about five miles in length, in a north-south direction and about two miles in width. The Atlanta Mine is in the northern part of the district, the Bradshaw Adit is about the southern limit of the district, and the Silver Park area is the western limit.

Topography:

No. U. S. Geological Survey topographic maps are available for this area. This area is as yet unsurveyed.

Dean R. Kenney, Kenney Aerial Mapping, 4900 East Indian School Road, Phoenix 18, Arizona, under contract with the present owners, prepared a base topographic map with a scale of 1" to 400' and a contour interval of 20 feet, for the entire Atlanta Mining District.

The mining district is at the north end of the Wilson Creek Range of mountains, southeast of a low pass that marks the beginning of the Fortification Range to the northwest. Elevations in the area range from 6,400 feet to 7,819 feet at Atlanta Mountain (Peak). The topography is typical of the Basin and Range physiographic province; with Lake Valley about six miles to the west, Snake Valley about ten miles to the east, and the south end of Spring Valley about five miles to the north.

Climate and Vegetation:

This region has an arid to semiarid climate. Precipitation ranges from about seven inches to 13 inches, with the higher mountain elevations receiving up to 18 inches per year. The prevailing wind is from the southwest and blows most of the year. Winters are moderate. This area is said to have a climate similar to Pioche, Nevada.

The vegetation consists mainly of northern desert shrub (sagebrush), Pinyon-juniper, and mountain grasses.

This is a good area for range cattle, sheep winter in the area. Wild horses and deer are common. Antelope can occasionally be seen. This area is said to be good mountain lion country. Rattlesnakes are supposed to be plentiful.

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Water Resources:

Flowing springs are found in this area. About three miles to the southwest of the Atlanta Mine is found the best running water in the immediate area. It represents the overflow of a small closed basin. It is thought it might be adequate, by proper excavation and damming, to supply by gravity flow enough water for a 500 ton per day mill.

Adequate water from water wells is thought to be available in either Spring Valley to the north or in Lake Valley to the west.

Spring Valley is one of the longest valleys in the region. It occupies a deep trench about 100 miles long. Spring Valley is a topographically closed, hydrologically undrained basin, in which the water table is close to the land surface. Up to 1963 (U.S. Geological Survey Water-Supply Paper 1475-L, p. 404) 34 wells had been drilled or sunk. Most of these provide water for stock use but some supply irrigation or mining needs. Spring Valley has been explored for water about as thoroughly as any similar area in the region, and successful wells seem to have been obtained wherever attempted. The chemical quality of the water is satisfactory for stock. So far as is known there are not instances in which mineralization is high enough to make the water unfit for use. According to U.S.G.S. Water-Supply Paper 1475-L, Plage 23, two wells are located in the N/2 Section 3, T. 7 N., R. 68 E., about three miles north of the Atlanta Mine. The surface elevation of one well is shown as 6640 feet with a water elevation of 6615 feet. The writer in company with Clyde Collins has been to a water well located in the SW/4 Section 14, T. 8 N., R. 68 E.

Lake Valley is about 60 miles long. Lake Valley is topographically closed in the north and open in the south. Drainage is southeastward through a narrow canyon to Meadow Valley Wash and the Colorado River. Up to 1963 (U.S. Geological Survey Water-Supply Paper 1475-L, p. 421) 36 wells have been dug or drilled in the valley. The valley fill appears to be saturated at some depth below the surface, as no dry holes or unsuccessful wells were found. The water table has a uniform slope southward. According to U.S.G.S. Water-Supply Paper 1475-L, Plate 23, one well is located in Section 16, T. 7 N., R. 67 E. about seven miles west of the Atlanta Mine. The surface elevation of the well is 6160 feet with a water elevation of 5875 feet.

Nature of Rock Exposures:

Rock exposures are considered to be fair to good in the district. A great amount of talus around Atlanta Mountain (Peak) masks the bottom contact of the Eureka quartzite. The Atlanta Mining District appears to be a window of Ordovician and Devonian sediments covered on the south and west by Tertiary-Cretaceous volcanic rocks. Thick stands of pinyon-juniper mask some of the croppings.

History:

The Atlanta Mining District, formerly known as the Silver Park or Silver Springs Mining District, was discovered in 1869. In 1872, two mills were in operation on rich silver ore from the west side of the district. Silver Park had a daily six-horse Concord connecting with the outside world at Palisade on the Southern Pacific Railroad.

In 1906 the Atlanta Group, on the north side of the district, was acquired by the Atlanta Consolidated Gold Mining and Milling Company. Early day production is unknown.

This mining district is apparently one of those by-passed and forgotten. WHY!!!

Mining and Production:

In the Atlanta Mining District are three separate areas where some exploration, by underground methods, has been done. On the west side is the Silver Park area; on the south side is the Conway and Bradshaw Adit area; and, on the north side is the Atlanta Mine area.

The Silver Park area (Silurian and Devonian sediments) consists of four patented mining claims: Lot No. 40 - Sam Tilden, Lot No. 41 - Roadside, Lot No. 42-Summit, and Lot No. 38 - Miners Delight. The hill in the vicinity of the Roadside Claim (?) has been honecombed with adits. One vertical shaft (there is an excellent specimen of an old horse-whim at the collar) was sunk. Production from this area is unknown. Horn silver and ruby silver are reported from these workings; and shipments of 300-ounce silver ore are rumored.

The Conway and Bradshaw Lode (Ordovician sediments) - Lot No. 37 (6.43-acres) consists of an adit 64-feet in length, about 75 feet of drifting, about 55 feet of winze, and about 40 feet of raising; for a total of about 234 feet of underground workings. Very little to no stoping was done. Production is unknown. Any ore??

In August of 1956 a portion of the Bradshaw Adit dump was trucked to the Kennecott Copper Corporation smelter at McGill, Nevada for sale as flux. The following data is from the Kennecott Smelter settlement sheets:

Lot. 1, date sampled 8/15/56, dry weight 263,574 pounds, 0.35% H_2O, 85.5% SiO_2, 1.9% Al_2O_3, 5.3% Fe, 0.05% CaO, 0.10-oz. gold, and 11.12-oz. silver, for a gross value per dry ton of $12.48.

Lot. 2, date sampled 8/21/56, dry weight 31,700 pounds, 0.32% H_2O, 86.5% SiO_2, 2.8% Al_2O_3, 4.3% Fe, 1.5% CaO, 0.22-ox. gold, and 13.14-oz. silver, for a gross value per dry ton of $18.06.

The Atlanta Mine (Ordovician sediments) has been extensively developed by underground work, and by a small open pit. The underground workings consist of the following:

90-feet of surface adits
82-foot vertical shaft
400-foot vertical shaft (Atlanta Mine shaft now in use)
298-feet of drifting and cross-cutting above the 100 level
572-feet of drifting and cross-cutting on the 100 level
30-feet of raise above the 100 level
35-feet of winze below the 100 level
1457-feet of drifting and cross-cutting on the 200 level
546-feet of raise above the 200 level
412-feet of drifting and cross-cutting on the 400 level
40-feet of winze below the 400 level

Thus the underground workings at the Atlanta Mine consists of 90-feet of surface adits, 482-feet of vertical shaft, and 3390-feet of drifts, cross-cuts, raises, and winze. No underground stoping was done.

There has been no production from the Atlanta Mine. Some bulk samples taken underground and mine run material from the surface open pit were trucked to the Kennecott Copper Corporation smelter at McGill, Nevada for sale as silica flux. This material was not shipped to make a profit, but rather to get accurate assay results of bulk samples. During 1954 and 1955, Atlanta Gold & Uranium Company (Clyde Collins) mined 22,000 tons from the present open pit. This rock was trucked to the smelter at McGill, Nevada; it averaged 0.33-oz. gold, and 1.16-oz. silver per ton, for a gross value of $12.59.

The Atlanta Mine has been developed by underground methods but numerous engineers have recommended that it be mined as an open pit.

Previous Investigations:

The Atlanta orebody has been examined by numerous engineers. Some 27 reports starting with George Kislingbury, April 25, 1910 to Peter Joralemon, May 25, 1962

have examined the property during various stages of its development. Those reports of the later years agree closely as to (1) tenor of ore reserves, (2) tons of ore reserves, and (3) the method of mining to be used to place the property in operation.

In the summary of available reports and records of development and sampling listed, ore values are in dollars per ton based on gold at $35 per troy ounce and on silver at 91¢ per troy ounce.

(1) Kislingsbury, George: Consultant, April 25, 1910:
Report to E. M. Bray, Manager of the Atlanta Mine, regarding sampling during the development in two "ore chimneys" by the No. 1 (north) and No. 2 (south) shafts and the cross-cuts and drifts from these shafts, claiming gold values in various parts of the two chimneys averaging from $8.50 to $21.00.
Comment: Sampled areas not specified; assays for gold only.

(2) Timmons, Colin: Consultant, February 1913:
Comment: Consultant's report without data, but with enthusiastic appraisal and recommendations.

(3) Stubonbord, J. J.: Manager of Atlanta Mine, April 1, 1913:
Report to Atlanta Consolidated Mining Company, Operators, describing samples in No. 1 and No. 2 shaft development.
Comment: Shaft No. 1, 100 Level- 60 feet of hanging wall rhyolite assaying between $1.75 and $3.50. Location is unknown - unless it is the main cross-cut from the shaft.

(4) Cosby, F. Nugent: Mining Engineer in charge of recent development, July 8, 1913:
Comment: First sampling of outcrop mentioned - 200 feet width averaging $3.75.

(5) Mineral Resources: 1914, Vol. 1, p. 689:
Comment: Abbreviated version of Hill's report of 1916.

(6) Abbott, J. W.: Mineralogical and Scientific Press, September 26, 1914, p. 486.
Comment: Discussion of ore genesis, associating ore with rhyolite "intrusion".

(7) Stubonbord, J. J.: February 1915:
Comment: Includes a report of an unspecified large tonnage of $7.00 to $8.75 gold ore.

(8) Myer, Paul W.: Engineering and Mining Journal, March 20, 1915; Developments at Atlanta , Nevada:
Comment: Generalized discussion including a statement that the Atlanta breccia zone extends 3,000 feet.

(9) Kirby, Thomas: September 1915:
Comment: Consultant's report estimating 320,000 tons of "proven" reserves averaging $8.75, and recommending further development and the first proposing cyanidation of the ore.

(10) Hill, James M.: U. S. Geological Survey Bulletin No. 648: Notes on Some Mineral Districts in Eastern Nevada, 1916:
Comment: Geological study localizing ore in a fault breccia zone, giving microscopic description of the ore, and proposing a sedimentary-volcanic sequence for the rocks of the district.

(11) Hewett, D. F.: Engineering and Mining Journal, Vol. 115, 1923: Carnotite in Southern Nevada:

Comment: Discussion of autunite mineralization in Atlanta Mine, and dating the uranium as later than the gold.

(12) Longyear, R. D.: E. J. Longyear Company, December 31, 1934:

Comment: Report of sampling and appraisal for Thrail West & Company, estimating probable ore above the 200 Level at 179,000 tons averaging 0.109-oz. gold and 2.38-oz. silver; and estimating possible reserves at 500,000 tons. Report recommended dropping option. The report presumed operation by underground mining.

(13) Perez, R. A.: January 7, 1936:

Comment: Metallurgical report to the Penobscot Mining Company (Manson family, Murphy, Wilfong, Sawyer, and Clyde Collins) giving the best results of two cyanidation tests on Atlanta ore of 93.7% gold recovery, and 22% silver recovery.

(14) Morgan, Robert: June 1936:

Comment: Report to underwriters for the Atlanta Mining and Refining Company, estimating 848,000 tons above the 200 Level averaging $7.51, with an additional 800,000 tons between the 200 and 400 Levels.

(15) Swart, W. G., Consulting Geologist, October 1936:

Comment: A five month sampling investigation, hand samples; estimate of 665,850 tons above the 200 Level averaging $5.08. He omitted the outcrop. Recommended a low-grade open pit operation, but assumed the surface croppings would have to be wasted. This is the first report to mention open pit mining, and is considered by the writer to be one of the best reports written on the property.

(16) Collins, Clyde E.: November 27, 1947, Report for Robert E. Phelan:

Comment: To support the underground sampling, 1,100 tons of ore were taken from the dumps of No. 1 and No. 2 shafts and trucked to the Kennecott Smelter at McGill, Nevada for sale as silica flux. Lots 1, 2, 4, 5, 6, and 7 came from the No. 1 shaft (cross-cuts on the 100 and 200 Levels). The hand sampled weighted average of this area was 0.116-oz gold and 1.11-oz silver; the smelter settlement assay on these lots was 0.142-oz gold and 2.02 oz silver.

Lot No. 3, 250 tons came from No. 2 shaft (workings of the 20, the 55, and the 82 Levels). These levels showed a weighted hand sampling average of 0.31 oz gold and 0.80-oz. silver; the smelter settlement assays on this lot were 0.36-oz gold and 0.93 oz-silver.

Since the ore shipped was of better grade than of careful hand-sampling, the smelter pulps were microscopically examined and found to contain calaverite, a telluride.

This is the first report to indicate that (1) hand sampling would probably be of a lower grade than bulk sampling, and (2) that a telluride might be present.

(17) Towle, Charles, C.; U. S. Atomic Energy Commission, April 28, 1948:

Comment: Snow on the ground at the time of the visit, didn't go underground; ran a radiometric survey across the surface.

(18) Gordon, Louis D., Reconstruction Finance Corporation, December 26, 1950:

Comment: Report of channel sampling and appraisal by the R.F.C. in response to an application by F. M. Manson & Roy A. Hardy for a government loan. Gordon approved the loan, estimating 625,000 tons of developed ore and an additional

300,000 tons of probable ore above the 200 Level with average values of $6.00 and $6.70 per ton respectively. Samples also assayed about one pound of U_3O_8 per ton.

R.F.C. lending authority terminated before the loan could be granted. Sampling includes first serious investigation of the outcrop ore, in which chip sampling for an average width of 105 feet indicated values of $6.65.

(19) Nelson, Harry E. U. S. Atomic Energy Commission, August 26, 1952:
Comment: Ran radiometric survey ofall underground workings. Samples were taken to check radioactivity equilibrium. Sample 10 feet above 100 Level on southeast end gave 0.137 U_3O_8 e, 0.140 U_3O_8 c, 0.04-oz. gold and 0.90-oz. silver per ton. Sample on 200 Level gave 0.012 U_3O_8 e, 0.011 U_3O_8 c, 0.04-oz. gold, and 2.80-oz. silver per ton. The uranium was considered to be in equilibrium.

(20) Dobson, Percy: July 15, 1954:
Comment: General report based on information assembled by Clyde Collins. Estimate 1,500,000 tons of ore in open-pit reserves averaging between $6.00 and $7.00 in gold and silver, with an additional $6.00 and $7.00 in uranium.

(21) Atlanta Gold and Uranium Company and Three Contractors, 1954 and 1955:
Comment: Clyde Collins started the present open pit. Shipments totalling 22,000 tons were trucked to the Kennecott smelter at McGill, Nevada for sale as silica flux; with an average grade of 0.33-oz. gold and 1.16-oz. silver, for a total value of $12.59 per ton.

R.F.C. channel sampling in this area showed an average of 0.203-oz. gold and 0.86-oz. silver, for a total value of $7.89 per ton.

Exact correlation between values of shipments and hand samples would not be expected, but neither would so large a discrepancy. The ratio between the average hand sample value and the smelter value is for gold (1 to 1.63) and for silver (1 to 1.49).

(22) Sharp, Byron J. and Myerson, Bert L., Preliminary Report on a Uranium Occurrence in the Atlanta Area, Lincoln County, Nevada; R.M.E. 2048 (Rev.), U.S. Atomic Energy Commission, January 1956.
Comment: This report contains the only known geological map of most of the Atlanta Mining District; the scale is 1" to 2,000 feet.
This paper is the first to discuss intrusive breccia pipes as having controlled the localization of gold, silver, and uranium minerals.

(23) Minerals Engineering Company, Grant Junction, Colorado, December 1955 to May 1956:
Comment: Underground bulk sampling and surface wagon drilling for which no report is available. Drill Hole locations, depths, and some classification of rock types in the holes appear to have been obtained by Atlanta Gold & Uranium officials, since most of the holes appear on the crosssections. Clyde Collins claimed to have been refused assays of the drill holes, and stated that Minerals Engineering could not command the necessary capital and wanted Atlanta to use its properties as collateral for a loan - he refused.

(24) Atlanta Gold and Uranium Company, Clyde Collins, 1956:
Comment: Wagon drill exploration, using the wagon drill left on the property by Minerals Engineering Co. This consisted of at least 10 additional holes, from the open pit to the south end of the 200 Level. Cuttings from the richest breccia averaged 0.18-oz. gold and 1.33 oz. silver. The low values are probably due to dilution and air classification of the drill cuttings.

(25) Camp Bird Mining Company, Ltd., May to August 1958, directed by C. P. Tromlett:

Comment: The program consisted of surface chip sampling, underground channel sampling, jointed-rod drill sampling in the crosscut headings, and bulk sampling of the crosscut walls.

The surface chip sampling was limited to the north end of the outcrop. Camp Bird sampled an average width of 87 feet between 100 North and 200 South obtaining average values of 0.142-oz. gold and 0.76-oz. silver, for a value of $5.66 per ton. The R.F.C. sampling between the same coordinates averaged 130 feet with average values of 0.143-oz. gold and 1.31 oz. silver, for a value of $6.20 per ton.

The Camp Bird hand-channel sampling of the crosscut walls seem to agree better with Swart than with the R.F.C.

(26) Hoover Construction Company, December 1960 to March 1961, directed by Peter J. Johnson and L. E. Smith:

Comment: The Hoover program consisted of bulk sampling by re-slashing of old crosscuts and by driving new crosscuts.

Two adits were begun on the surface. At 50 feet south of the collar of the Atlanta shaft an adit was driven 50 feet, entering the ore breccia at 20 feet from hanging wall volcanics (rhyolite?). The breccia from 0 to 5.5 feet assayed 0.20-oz. gold and 0.90-oz. silver, for a gross value of $7.82 per ton.

At 200 feet north of the collar of the Atlanta shaft an adit was driven 41 feet, entering breccia at five feet from hanging wall volcanics. The breccia from 0 to 27 feet assayed 0.037-oz. gold and 0.46-oz. silver, for a gross value of $1.72 per ton. The face is in a fault zone.

Hoover Construction sample lots shipped to the Kennecott smelter at McGill, Nevada from crosscuts No. 2, 3, 4, and 5 on the 200 Level averaged 0.08-oz. gold and 3.54-oz. silver for a gross value of $6.02 per ton.

A new incline crosscut driven between old crosscuts No. 5 and 6 on the 200 Level at 410 South (lots shipped to McGill) from 0 to 33 feet assayed 0.13-oz. gold and 2.26-oz. silver for a gross value of $6.60 per ton. Hoover Construction samples from 33 to 45 feet averaged 0.125-oz. gold and 5.62 oz. silver for a gross value of $9.50 per ton.

Hoover Construction extended the crosscut east of the shaft on the 200 Level 53 feet to the north. Their samples average for 53 feet at 0.072-oz. gold and 0.83-oz. silver for a gross value of $3.27 per ton. The most northerly sample of four feet assayed 0.215-oz. gold and 2.09-oz. silver for a gross value of $9.42 per ton.

(27) McKinney Mines, Vancouver, British Columbia, Canada, May to December 1962, Directed by Peter J. Joralemon and Henry L. Hill (H. Hill & Starck & Associates, Ltd.):

Comment: Report of May 25, 1962 by Peter J. Joralemon most enthusiastic seen of all reports on the Atlanta Mine.

McKinney Mines, on the 200 Level, extended the workings south of No. 6 crosscut with 332 feet of drifting and crosscutting. Above this new work they drove 247 feet of new raises.

On the 200 Level, north of the shaft, McKinney Mines drove two raises for a total of 220 feet.

The McKinney mine maps of their work and the actual work as mapped by the writer are in conflict.

On Tuesday February 2, 1965 a conference was held in the office of Henry L. Hill, 844 W. Hastings, Vancouver, British Columbia. Mr. Hill stated that he did no mapping or sampling underground at the Atlanta Mine; that Peter

J. Joralemon did all the underground mapping and followed the development work; that Mr. Ditto, a miner, was in charge of the mining and sampling.

Mr. Hill stated that he had visited the property twice and had written a report on the economics of mining and milling the 1,000,200 tons between the surface and the 6650 foot elevation (50 feet above the 200 Level). He gave the following information from his report:

Grade (5% dilution allowance)	0.134oz. gold per ton 1.15 oz. silver per ton
Waste to ore ratio (5% dilution allowance).....	0.94:1
Value of ore (based on $28 per ounce gold and $0.74 per ounce silver).....	$4.69 per ton
Mining (based on contract price of $ 0.62 per ton of material) 1.94 (0.62).....	$1.20 per ton
Milling.....	$1.24 per ton
Administration and general	$0.48 per ton

Report recommended dropping of option.

Available Map Coverage:

The only map available for this area is that of the U. S. Geological Survey, Lund, Nevada, NJ 11-6, Western United States, scale 1:250,000.

No U. S. Geological Survey quadrangle topographic maps are available, as yet this area is unsurveyed.

The general geology of the area is covered by U. S. Geological Survey MF-206, Preliminary Geologic Map of Lincoln County, Nevada by C. M. Tschanz and E. H. Pampeyan, 1961, scale 1:200,000.

A partial geological map of the district, scale 1" to 2,000', was made by Byron J. Sharp and Bert L. Myerson (RME-2048 Rev.), U. S. Atomic Energy Commission, January, 1956.

Dean R. Kenney, Kenney Aerial Mapping, 4900 East Indian School Road, Phoenix 18, Arizona, under contract with the present owners, prepared a base topographic map at a scale of 1" to 400', contour interval of 20', for the Atlanta Mining District.

The Atlanta Mine, prior to this investigation, both underground and on the surface had been mapped at a scale of 1" to 100'; cross-sections and a long-section had been made; and, a surface assay map at a scale of 1" to 20' had been made. Apparently most of this work was done by Atlanta Gold and Uranium Company under the supervision of Clyde Collins - the maps have no name of the person responsible on them.

Duval Sulphur & Potash Company, Copper Division, Tucson, Arizona under the direction of their Chief Geologist, Jack Frost, made available their surface and underground maps of the Atlanta Mine, scale 1" to 100'.

PURPOSE AND SCOPE:

This geologic investigation was done from January 23, 1965 through June 26, 1965; first for Robert M. Jordan, then for Deep Sand Petro-Energy Developments, Inc. (Robert M. Jordan, President), and finally for Eugene Jordan & Associates.

Reasons for Study:

The reasons for the investigation were the following:

(1) To review all existing reports on the Atlanta Mine and to either recommend that Robert M. Jordan acquire the property or not acquire the property.

(2) To discount the adverse McKinney Mines report (the last group to have an option on the Atlanta Mine).

During late January and early February 1965, in company with Robert M. Jordan a trip was made to Vancouver, British Columbia, Canada for the following reasons:
(1) To talk with Morris Black (a personal friend of Robert M. Jordan) about financing this project.
(2) To talk with Henry L. Hill of H. Hill & Starck & Associates, consultanta for McKinney Mines, about their maps, assays, and mill tests on the Atlanta Mine ore.
(3) To contact Edgar A. Scholz (a personal friend of the writer), Exploration Manager for Placer Development, Ltd. about their knowledge of the Atlanta Mine.

MdKinney Mines (as reported by Henry L. Hill) is supposed to have spent $350,000 on exploration work at the Atlanta Mine; it is thought they actually spent about $50,000.

McKinney Mines (as reported by Morris Black) raised over $1,000,000 selling stock in Canada on the merits of the Atlanta Mine. Mr. Black would not finance the Atlanta Mine venture for Robert M. Jordan.

Edgar A. Scholz agreed as to 1,400,000 tons of developed ore at the Atlanta Mine, with a grade of 0.140-oz. gold and 1.78-oz. silver per ton. He stated that Placer Development Ltd., had examined the property and had tried to negotiate a deal for it; that they were still interested and if additional tonnage of ore could be found, they would like to come in on it.

Upon the return to the Atlanta Mine, the geology of the underground work done by McKinney Mines was mapped - this work (as shown on the McKinney maps) was found to be in error. It was then recommended that Robert M. Jordan acquire the property. The geologic investigation then turned to:
(1) Negotiation with Clyde Collins (Atlanta Gold & Uranium) on the purchase price and the terms of an agreement. On February 8, 1965, the basic terms of a total price of $1,000,000 (for all the properties of Atlanta Gold and Uranium, including the Roy Hardy - Crown Mill) with $100,000 cash to be paid by June 1, 1965, were agreed. Later Roy Hardy tried to kill the agreement by withdrawing the Crown Mill, for he was dealing with Duval Sulphur & Potash Company. Subsequent negotiations produced an agreement of a total price of $800,000 (for the Atlanta Mine and all the ground held by Atlanta Gold and Uranium in the Atlanta Mining District), with $100,000 cash to be paid by June 1, 1965. Jack Little, President of Atlanta Gold & Uranium, later agreed to sell the Crown Mill for $45,000 cash.
(2) Negotiation with Edwin Park and Jim Hulse for their holdings north of the Bradshaw adit on the Atlanta Mining District.
(3) Negotiation with Phil Dolan for the Conway and Bradshaw patented claim, and the other holdings of his group in the Atlanta Mining District.
(4) Negotiation through Clyde Collins for the three Dick Knight patented claims in the Silver Park area of the Atlanta Mining District.
(5) Discussion with Western-Knapp about someone to appraise the value of the Crown Mill (they recommended Jim Nissen of Auburn, California) and a physical inspection of the Crown Mill on March 19, 1965 in company with Robert M. Jordan, Clyde Collins, and Mrs. Collins. While in Winnemucca, Nevada, Clyde Collins contacted Roy Caldwell, a Registered Engineer, to work locally with Jim Nissen.
(6) Discussion with Eugene Jordan on the merits of the Atlanta Mine, the Atlanta Mining District, and Clyde Collins. An exploration program, that would do the annual assessment work, and would cost from $30,000 to $40,000 would be undertaken to open up the ground from the Atlanta Mine south to the Bradshaw Adit area. Eugene Jordan agreed to finance the entire project.

Extent of the Geological Investigation:

The Atlanta Mine was considered to be but one part of the whole district, thus it was proposed that the Atlanta Mining District, as a whole, should be studied. No base map of the district was available; it was decided to fly the area and to make a base map.

Aerial Mapping:

On March 23, 1965, Maddock Associates Aerial Survey, Inc. (Dean R. Kenney Aerial Mapping), 4900 East Indian School Road, Phoenix 18, Arizona was contacted. The Atlanta Mining District, the probable location of the water supply line to the Atlanta Mill site, and the proposed location of the power line to the Atlanta Mill site were discussed.

The contract price for the power line survey (this is not an exploration item) was at the rate of $250 per mile, thus $1,500 for six miles of power line route was included in the original agreement, for the total length of the proposed power line was at that time unknown. Additionally mileage could be figured from the fixed rate.

The contract price for the Atlanta Mining District, photographs and a base map of 2.5 miles by 3.0 miles at a scale of 1" to 400', with contour interval of 20', plus an extension north to the known water well was $3,500. Color obliques were to be taken.

At this time, March 23, 1965, a check in the amount of $2,000 to Maddock Associates Aerial Survey, Inc. was given to Mr. Kenney, as an advance payment for this work. Dean Kenney was to write Robert M. Jordan confirming this discussion.

Mr. Kenney was also to study the technique of taking infra-red pictures and was to submit an additional cost estimate for taking infra-red pictures of the Atlanta Mining District.

The final costs were: survey of the power line (not exploration) 14.9 miles at $4,145.00; and coverage of the Atlanta Mining District (exploration) three miles by five miles at $4,915.00.

Assaying:

On March 25, 1965, Union Assay Office, Inc. Assayers & Chemists, P. O. Box 1528, 152-154 South West Temple Street, Salt Lake City 10, Utah (Glen Williams) was contacted.

The assay problems of the Atlanta Mining District were discussed. It was agreed that all samples from this area would be assayed as low grade ore. Union Assay would use one assay-ton of ore for each assay; they would add a given amount of silver to each assay, to be later subtracted; they would add flux for any telluride; and, they would save all pulps.

At this time a check in the amount of $1,000 to Union Assay Office, Inc. was given to Mr. Williams.

No contract price was agreed upon, it was thought it would be about $3.00 per assay for both gold and silver. Mr. Williams was to write to Robert M. Jordan giving the contract price.

A total of 142 samples were sent to Union Assay up to June 26, 1965 for a total assay cost of $964.50, exclusive of postage.

Diamond Drilling:

On March 25, 1965, Boyles Brothers Drilling Company, 1624 Pioneer Road, Salt Lake City, Utah (Paul A. Park and James F. Brennan) were contacted. No records or estimates were found in their files for any bids submitted by Boyles Bros. for any kind of drilling in the Atlanta Mining District, Lincoln County, Nevada.

Arrangements were made for Joe Fetterhoff, 801 Industrial Way, Sparks, Nevada

(P. O. Box 946), Manager of the Reno Branch Office to have Gerald Willden contact us in Pioche, Nevada at a later date to discuss drilling costs.

On April 22, 1965, Gerald Willden, Field Superintendent for Boyles Bros. Drilling Company, was conducted on a tour of the Cedar No. 3 and Cabin No. 15 claims. It was suggested for a test drilling period, Deep Sand would pay all drilling costs, plus 10%, so that the actual drilling costs could be figured; Deep Sand to advance Boyles Bros. $5,000 as a retainer for the drilling. Gerald Willden met Robert M. Jordan and was to write to Mr. Jordan after he had discussed this proposal with Boyles Bros. in Salt Lake City, Utah.

On May 3, 1965 the Boyles Bros. Drilling Contract was received. The terms were: (1) moving of rig in - $500; (2) drilling rate of $165 per day, one shift of two men; (3) Deep Sand to pay all diamond loss, cement, etc. The retainer in the amount of $5,000 was sent to Boyles Bros.

Drilling started May 18, 1965 and was stopped June 11, 1965; Diamond Drill Hole No. 1 was drilled at a minus 45° for 424 feet; Core was NX; core recovery in breccia was 90.86% (0 to 341 feet), core recovery in limestone was 98.13% (341 to 424 feet). where

The cost of diamond loss for the drilling of Diamond Drill Hole No. 1 was $888.66; total money paid to Boyles Bros. was $5,087.36 for a total cost per foot of $11.98, or $10.82 per foot (excluding the move in cost of $500).

Bulldozing and Motor Patrol Work:

On March 22, 1965 an Allis-Chalmers HD-21D cat was contracted from F. W. Millard & Son, Ely, Nevada at the rate of $27 per hour, for work in the Atlanta Mining District. A check in the amount of $2,000 as an advance payment was mailed to them.

On March 31, 1965 a D-8-36A Caterpillar Cat with a hydraulic ripper arrived on the Job. Hoover-McGhan, Salt Lake City, Utah had taken the job from F. W. Millard & Son.

From March 31, 1965 to May 18, 1965 the D-8-36A cat logged a total of 209 hours on access roads, trenching, and ripping for a total exploration cost of $5,643. During this period of time approximately 53,000 feet of pioneer access roads and trenching were made.

From May 11, 1965 to May 18, 1965 an Allis-Chalmers 24 Motor Patrol contracted from Hoover & McGhan at the rate of $14 per hour, logged a total of 32 hours on blading and ditching the access roads for a total exploration cost of $448.

Thus the total exploration cost for the cat and blade was $6,091.

On May 13, 14 and 15, 1965 the Allis-Chalmers 24 Motor Patrol logged a total of 31 hours grading the old Atlanta Air Strip (constructed in 1954 by Clyde Collins), for a (not exploration) cost of $434.

On April 28, 29, and 30, 1965 the D-8-36A cat logged 20 hours bulldozing the Power Line right-of-way; from May 18 through May 22nd 1965 it logged an additional 27 hours, for a total of 47 hours and a (not exploration) cost of $1,269.

On May 16, 1965 the Allis-Chalmers 24 Motor Patrol logged 7 hours grading on the Power Line Right-of-way; from May 20 through May 22, 1965 it logged an additional 40 hours, for a total of 47 hours and a (not exploration) cost of $658.

Thus the total cost (not exploration) for the cat and blade on the Power Line Right-of-way (14.9 miles) was $1,927.

Claim Surveying - R. W. Millard & Associates:

On March 17, 1965, in company with Robert M. Jordan and Clyde Collins, the records of R. W. Millard & Associates, Ely, Nevada were checked for maps of the

Atlanta Mining District. Prints of all deemed to be useful were ordered from the Office Manager, Bob Mason.

The name of the firm was changed January 1, 1965 from F. W. Millard & Son to R. W. Millard & Associates.

According to Clyde Collins, F. W. Millard & Son had done nearly all of the surveying over the years in the Atlanta Mining District; they had worked for him, and from his own personal experience were a first-rate firm.

During the evening of April 27, 1965, Robert M. Jordan telephoned from Las Vegas, Nevada that he had been checking the records; the ownership was in question on the claims in the southern part of area (claims quit claimed by Jack Little), that a portion belonged to Getchell Mines. He suggested that R. W. Millard & Associates be contacted to make a claim survey so that we would know exactly where the various claims were located, for Clyde Collins did not know the location of the claim corners, and could not help Dean Kenney with the panneling of the corners for the aerial survey.

On April 28, 1965, R. W. Millard & Associates, Ely, Nevada (Bob Mason) was contacted by telephone about supplying a field crew to relocate claim corners in the Atlanta Mining District so they could be panneled for aerial photography.

At a conference on May 3, 1965 with Robert M. Jordan and Clyde Collins it was decided to have R. W. Millard & Associates tie in the claims on the north end, make a water well survey, and talk with them about the right-of-way for the Power Line.

On May 7, 1965, Dave Millard of R. W. Millard & Associates arrived on the job with a field crew. Dave Millard drove to Pioche, Nevada to pick up the retainer of $2,000 and while in Pioche, met and talked with Dean Kenney about panneling of the claim corners for the aerial photography.

On May 12, 1965 a conference was held at the mine with Bob Mason, Office Manager, R. W. Millard & Associates on the work they were to do in the area for Deep Sand. This work was to consist of the following: (a) survey of the north claims (old mill site area); (b) survey around the patented Atlanta claims, resurvey of the unpatented claims of the Atlanta group; (c) resurvey of the Dolan claims; (d) resurvey of the Hulse-Hezzelwood-Park group; (e) survey of the Atlanta claims south of the Dolan group; (f) mark all corners with regulation posts, materials to be provided by Millard; (g) mark all corners with aluminum bands; (h) panel all unpatented claim corners, panel around patented Atlanta claims, for aerial photography; (i) mark the outside corners of the patented claims in Silver Park, property owned by Dick Knight; (j) when the job is finished to provide Deep Sand with a 1" to 400' map of the entire district. Bob Mason telephoned that evening to say that he had talked with Mr. Millard; they figured a ten man crew would take five weeks; the cost would be about $4,000 per week for a total cost of about $20,000. Robert M. Jordan was advised of the cost estimate.

On June 16, 1965 at Pioche, Nevada, Dave Millard was told by Robert M. Jordan that he wanted R. W. Millard & Associates to get off the job now; and, that he wanted none of their work (maps, notes, nothing).

Water Wells:

On May 4, 1965, J. D. Hill, P. O. Box 694, Ely, Nevada arrived at the mine after being contacted by Robert M. Jordan to drill a water well for the proposed mill. His contract price was $10 per foot for an 8" hole. He was given a $1,000 retainer.

On June 4, 1965, Ben Gardner and Ben Gardner Jr., 7888 West 2400 South, Magma, Utah moved their water well drilling rig on the property and started drilling (brought in to do the job by Mr. Hill).

Water Well No. 1 (see Plate 5) was located at the south end of the district to give gravity feed to the mill. The hole was collared in gray Tertiary-Cretaceous volcanic rock. At 395 feet, water estimated to be about 40-gal. per minute was encountered. At 430 feet an air pocket was encountered and all water was lost. The hole was drilled to about 950 feet before being abandoned as a dry hole.

At 395 feet white lime was found in the cuttings; and at 485 feet fine sulfides (probably pyrite) were found in the cuttings.

Water Well No. 2 (see Plate 5) was located at the north end of the district. It was collared in alluvium and apparently was in alluvial fill down to 245 feet. From 245 to 265 feet the hole appeared to be in silica breccia (cuttings checked by Steve Owens of Duval). Cuttings from 255 to 260 feet assayed 0.02-oz. gold and 0.08 oz. silver per ton. The hole was stopped at about 265 feet.

Water Well No. 3 was located on the Power Line right-of-way, about seven miles west of the mill, in Lake Valley. The total depth of the well is 505 feet, with water standing at 150 feet from the surface.

Mine Mapping:

The geology of all of the accessible underground workings of the Atlanta Mine and the Bradshaw Adit were mapped by Brunton and Tape at a scale of 1" to 20'.

A composite geologic map of the workings of the Atlanta Mine, both underground and the open pit, was prepared at a scale of 1" to 20' (see Plate 1). Two geologic cross-sections of the Atlanta Mine workings, at a scale of 1" to 20', were prepared (see Plate 2).

A geologic map of the workings of the Bradshaw Adit and a geologic cross-section of the Bradshaw workings, at a scale of 1" to 20', were prepared (see Plate 3).

The geology of two tunnels (Adit "a" and Adit "B") southwest of the Atlanta Mine were mapped by Brunton and Tape at a scale of 1" to 40'. This geology has been plotted on the base map of the district (see Plate 5).

Surface Mapping:

The geology of all of the surface dozer roads and trenches were mapped by Brunton and Tape, at a scale of 1" to 400'. This geology has been plotted on the base map of the district (see Plate 5).

The geology of the South Breccia Outcrop Area (see Plate 4) was mapped at a scale of 1" to 40' by Brunton and Tape.

The geology of the Atlanta Mine Open-Pit area was mapped at a scale of 1" to 20' by Brunton and Tape (see Plate 1).

Drill Core - Diamond Drill Hole No. 1 - Logged:

The geology of the core of Diamond Drill Hole No. 1 was logged at a scale of 1" to 20'. At this time too, the core was split for samples for assay. The log of the hole from 0 to 341 feet (breccia zone) had a core recovery of 90.86%; from 341 to 424 feet (dark gray limestone) a recovery rate of 98.13%. See Plate 4, for the hole location and cross-section of the hole.

Aerial Photographs:

This area was flown by the U. S. Army Map Service in 1954.

On February 3, 1965 the Photo-Index sheet covering this area was ordered from the Map Information Office of the U. S. Geological Survey, Washington 25, D.C.

The Photo-Index sheet was received March 20, 1965 and on March 22, 1965 a total of 39 contact prints of 9" x 9" size of the region were ordered along with two enlargements of the Atlanta Mine area. These photographs were received June 22, 1965.

On July 22, 1965 a series of five prints of 9" x 9" size were received of the Atlanta Area from the Kenney Aerial Mapping Service; and on August 13, 1965 the base map of the Atlanta Mining District at a scale of 1" to 400', and a contour interval of 20' along with other aerial photographs were received for study.

Study of the photographs revealed numerous lineaments. The lineaments were posted on the Kenney Photographs (Atlanta Mine, 9" x 9", series of 7/9/65, No. 2-5, and 2-6). Some of the lineaments were posted on the 4x Enlargement, Symbol 109F, Roll No. 121, Photograph No. 15217, Army Map Service.

Discussion of the lineaments will be found under "Geology-Structure".

GENERAL GEOLOGY:

The geology of the Atlanta Mining District is characteristic of the Basin and Range Province, wherein block faulting has produced a system of northward trending mountains and valleys. The mountains are being eroded and the erosional products are deposited in the valleys.

The most distinctive geologic feature is the faulting along which the valleys have been depressed in relation to the mountains.

The sedimentary rocks - limestones, dolomites, shales, and quartzite range in age from Lower Ordovician to Middle (?) Devonian.

Tertiary-Cretaceous rocks of extrusive origin are widespread.

Irregular pipes of silica breccia are prominent features in the area.

Sedimentary Rocks:

The aggregate thickness of stratified rocks in this area is unknown. The stratigraphic section presented below is from U.S. Geological Survey Map MF-206, Preliminary Geologic Map of Lincoln County, Nevada, 1961.

Tertiary-Cretaceous - Older volcanic rocks
Devonian - Simonson Dolomite (400 to 1200 feet)
Devonian - Sevey Dolomite (300 to 1600 feet)
Silurian - Laketown Dolomite (300 to 1000 feet)
Ordovician - Ely Springs Dolomite (100 to 550 feet)
Ordovician - Eureka Quartzite (230 to 550 feet)
Ordovician - Pogonip Group (Tank Hill Limestone)

Sharp and Myerson (RME-2048 Rev., U.S. Atomic Energy Commission, January 1956, p. 9, found the following stratigraphic section in the Atlanta Mining District:

Ordovician - Ely Springs Dolomite (about 400 feet)
Ordovician - Eureka Quartzite (about 230 feet)
Ordovician - Tank Hill Limestone (about 250 feet)

Insufficient mapping by this writer makes it impossible to give a stratigraphic column for the Atlanta Mining District.

Zones of silicification and brecciation are extensive in all the sediments, from the Ordovician to the Devonian.

The major amount of gold and silver has been found in breccia pipes in the Ordovician Ely Springs Dolomite at the Atlanta Mine and the Bradshaw Adit.

The highest silver values has been found as veins or stringers in the Silurian Laketown Dolomite and the Devonian Sevey Dolomite in the Silver Park area.

The highest uranium values shipped has been found in a breccia pipe in the Ordovician Tank Hill Limestone (?) at the Blue Bird Mine. Small amounts of high-grade uranium (1.0% U_3O_8) have been reported from the Earl Rath No. 5 claim, southeast of the Bradshaw Adit, in a silicified zone in Ordovician Ely Springs Dolomite (?).

Metamorphic Rocks:

A piece of mica schist was found as float in the extreme southern part of the district (see location on Plate 4). In this general area too, was found some epidote.

Some of the core from Diamond Drill Hole No. 1 appeared to be metamorphosed.

Igneous Rocks:

Tertiary-Cretaceous volcanic rocks unconformably overly the sedimentary rocks to the south and to the west.

Igneous rocks exposed in the area include rhyolite, rhyolite tuff, obsidian, and andesite.

Rhyolite is found in the Atlanta Mine and is thought to be an intrusive sill.

Rhyolite breccia (?) is found exposed by the Hi Road- west of Atlanta Mountain (Peak) and is thought to be intrusive.

Structure:

Study of the aerial photographs revealed numerous lineaments. If these topographic features are resultant from faults - then this area is thought to be highly faulted by major structures.

The numerous lineaments indicate three major trends: (1) from about North to about N. 10° W.; (2) from about N. 35° E. to about N. 65° E.; and, (3) from about S. 80° E. to about N. 80° E.

The longest lineaments are those from North to about N. 10° W. Some of these are greater than five miles in length. They pass from the sediments in the northern part of the district through the volcanic rocks of the south.

The Atlanta Mine is in close proximity to one of these lineaments, and could possibly be the fault contact between the rhyolite and the rocks to the east, as seen on the 400 Level. This same lineament, it is thought, forms the western boundary of the Devonian sediments shown in the northern part of the district (see Plate 5). It is thought to be represented by faulting that strikes N. 10° W. and dips 60° to 70° to the NE. Silica breccia is found in this northern area and is thought to be localized at an area of fault intersection.

The South Breccia Outcrop Area is thought to be bounded on the west by a N. 20° W. striking lineament.

The second longest lineaments are those from about N. 35° E. to about N. 60° E. and are over two miles in length. The Silver Park mining area is bounded on the southeast side by one such lineament.

The group of lineaments from about S. 80° E. to about N. 80° E. are in much shorter segments, and quite possibly have been broken and offset by the other groups. All mineralized areas in the district have this group of lineaments common to them.

One lineament of this group (S. 80° E. to about N. 80° E) apparently forms the north boundary of the Silver Park Mining area and continues to the east and is thought to be the fault cut by the Hi Road at 800 feet northwest of the Hulse Shaft.

At the intersection of some of the major lineaments are found the breccia pipes.

Folds:

No folding of the sediments was mapped by the writer.

The only area where a suggestion of folding was seen was in the South Breccia outcrop area, in the vicinity of Samples No. A-4667 and A-4668 (see Plate 5). Here also the sediments have been cut by faulting and have been altered by the addition of silica and iron.

Faults:

The rocks in the district have been highly faulted. Faults have been exposed in the numerous pioneer road cuts made during this investigation.

A major fault (N. 60° W., vertical dip) was exposed by bulldozing on the Hi Road at the old Hulse Shaft. The shaft was sunk in the fault zone for more than 20 feet, in highly colored (red, yellow, and white) clays. This fault forms the southern boundary of the Eureka quartzite on this side of Atlanta Mountain.

A major fault(N. 85° E., 65° SE dip) was exposed by bulldozing on the Hi Road about 800 feet northwest of the old Hulse Shaft. Unaltered Eureka quartzite is found north of the fault. South from the fault for about 500 feet is a highly mineralized area of altered rhyolite (?) breccia and massive silica breccia. Iron and manganese oxide are found in this area. Even the Eureka quartzite is broken, recemented, and mineralized in this area.

A major fault (N. 20° W., 50° (?) NE dip) is thought to be represented by about 40 feet of highly altered clay or shale just west of the portal of the Bradshaw Adit.

Both surface and underground mapping of the geology at the Atlanta Mine revealed four large faults (see Plates 1 and 2). On the 400 Level are found two major faults. One is located at 112 feet west of the shaft; it strikes N. 5° E. and dips 80° NW. The second is 182 feet west of the shaft; it strikes N. 15° E. and dips 80° SE. The displacement of these faults is not known.

On the 200 Level of the Atlanta Mine, at 40 feet south of the No. 6 Crosscut is found a fault (N. 80° E. strike and 40° NW dip) that has apparently cut and offset the Atlanta Breccia-Ore-Body (see Plate 1). South of the fault the offset is thought to be about 130 feet to the east, as indicated by the shift of the rhyolite. This offset position of the Breccia-Ore-Body appears to be true also from the mapping of the surface croppings.

Mapping the geology has shown that on the Surface, 100 Level, and the 200 Level, a fault zone with a strike of from about North to about N. 40° E. and a dip of about 45° NW cuts diagonally across the Atlanta Breccia-Ore-Body (see Plates 1 and 2). It appears that the Breccia-Ore-Body west of the fault has dropped.

In the Northern part of the Atlanta Mine (100 Level at 100 feet east of the shaft) this fault has been used as the footwall of the Breccia-Ore-Body. This is not thought to be the case. It is thought that the main Breccia-Ore-Body lies to the east of the present face of the crosscut from the shaft.

Breccia Pipes:

Irregular to elliptical pipes of breccia are prominent structural features of this area.

The breccia pipes of the Atlanta Mine and the Bradshaw Adit area are thought to have been intruded, since fragments of the underlying Eureka Quartzite accompany silicified fragments of dolomite and limestone.

More than one stage of brecciation has been recognized. Indeed, if the matrix colors of the breccia zones in the surface croppings east of the Atlanta Shaft are indicative of various stages of brecciation, then ten or more stages could be present.

The Atlanta Mining District is characterized by an unusual development of mineralized breccia pipes that contain gold, silver, platinum, uranium, and copper. All are apparently of different ages.

Mineralized breccia pipes, because of their widespread occurrences and close structural relation to some of the world's great ore bodies, are objects of unusual interest. A mineralized breccia pipe is a pre-mineral, breccia structure which has controlled the circulation and deposition of subsequently introduced minerals. It is composed of relatively rotated angular or rounded rock fragments, set in a mineralized matrix. The pipe is a steeply plunging, chimney-like mass of brecciated rock cemented with later minerals.

Geologic History of Area:

The Atlanta Mining District's rocks consists of paleozoic limestones, dolomites, and quartzite, probably, at one time capped by a series of Tertiary-Cretaceous volcanics including andesite and rhyolite flows and tuffs.

It is thought a deep-seated granite has been intruded under this area, with a related acid differentiate of rhyolite of the Atlanta Mine.

Block faulting of the region has produced a system of northward trending mountains and valleys. The intersection of major faults, in the Atlanta area, formed a shattered breccia structure which controlled the circulation and deposition of subsequently introduced minerals of silica, calcite, barite, gold, silver, platinum, uranium, copper, molybdenum, manganese, and iron. These mineralized zones are in breccia pipes. The age of the mineralization is not known.

MINERAL DEPOSITS:

Gold and silver ore of commercial grade for open-pit mining has been developed in the Atlanta Mining District at the Atlanta Mine.

Atlanta Mine:

The Atlanta gold deposit occurs in a silicified breccia zone that strikes about N. 20° W. and was formerly thought to dip to the west at about 45°, between a dolomitic limestone (Ordovician - Ely Springs Dolomite) and a rhyolite hanging-wall. The silicified breccia zone has been developed by undergronnd workings to a depth of about 300 feet, along the strike for about 600 feet, and was formerly thought to have a thickness varying from 50 to 150 feet.

Gold, silver, platinum, and uranium, occurring in sub-megascopic particles, are disseminated in the matrix of the silicified breccia. The silver mineral is as yet unidentified. The gold to silver ratio varies from about 1:7 near the surface to about 1:24 on the lower level. The silicified breccia in bulk samples has been found to contain approximately 82% silica, 3.5% iron, 2.0% alumina, 3.5% water, and 2.0% lime.

It has been estimated there are about 1,400,000 tons of developed ore reserves, that can be mined by the open-pit method, with a waste ratio of from 1.3 to 1.6 tons of waste to one ton of ore. The tenor of the ore has been estimated to be 0.140-oz. gold and 1.78-oz. silver per ton.

Geologic mapping of the underground workings and the surface cropping (see Plates 1 and 2) indicate that the concept of the Atlanta-Breccia-Ore-Body should be changed in five ways:

(1) On the 200 Level, at about 40 feet south of the No. 6 crosscut is found a fault that appears to have cut and offset the Atlanta-Breccia-Ore-Body. The position of the hanging-wall rhyolite has moved about 130 feet to the east. This offset position to the

east, south of the fault, appears to betrue also from the mapping of the surface croppings of the silica breccia in this area. Thus it is though the surface croppings have been extended from about 600 feet in strike length to over 1,100 feet in strike length.

The length and width south and east of this fault is not known.

(2) On the surface, the 100 Level, and on the 200 Level a fault zone diagonally cuts across the Atlanta-Breccia-Ore-Body. The west side apparently has dropped. In the northern part of the Atlanta Mine, this fault zone has been used as the footwall of the Atlanta-Breccia-Ore-Body. It is thought the main Breccia-Ore-Body lies to the east of the fault.

(3) It was formerly thought the dip of the Atlanta-Breccia-Ore-Body was to the west. This is not thought to be the case. It is thought the Breccia-Ore-Zones dip to the east (see Plate 2).

(4) The width of the Atlanta-Breccia-Ore-Body is not known. The only section where a possible measurement could be made was at the south end of the Open-Pit, east of the fault. Here it is thought the Atlanta-Breccia-Ore-Body is in exeess of 200 feet in width, and could be in excess of 300 feet wide if a horse of brown dolomite is included.

(5) It is thought there are POSSIBLE ore reserves in excess of 6,000,000 tons; length 1,100 feet plus, width 300 feet plus, depth from surface 200 feet plus.

Bradshaw Adit:

Production from the Bradshaw Adit is not known. The Bradshaw Adit and the Atlanta Mine are in apparent indentical rock types (Ordovician - Ely Springs Dolomite) and are similarily mineralized, and differ mainly in higher values of silver at the Bradshaw. They appear to have the same origin. Very little development work has been done at the Bradshaw.

In August of 1956 a portion of the Bradshaw dump was trucked to the Kennecott Copper Corporation smelter at McGill, Nevada for sale as flux. The following data is from the Kennecott settlement sheets: Application says 63,574 dry wt.

Lot 1, dated sampled 8/15/56, dry weight 263,574 pounds, 0.10-oz. gold, and 11.12-oz. silver, for a gross value per dry ton of $12.48.

Lot 2, date sampled 8/21/56, dry weight 31,700 pounds, 0.22-oz. gold, and 13.14-oz. silver, for a gross value per dry ton of $18.06. 63,574 dry wt.

Geologic mapping of the Bradshaw Adit shows the silica breccia to contain quartzite fragments, thought to be Eureka quartzite. The silica breccia zone strikes about N. 45° W. and dips about 45° NE (see Plate 3).

It is thought the silica breccia exposed in the Bradshaw Adit is but a finger from the main silica breccia mass that outcrops on the surface at 160 feet north of the portal of the adit. The size of this surface silica breccia cropping is not known - it has not been mapped.

It is thought the croppings of silica breccia in this area should be sampled by taking bulk samples of 50 tons per lot.

South Breccia Outcrop Area: Loc ?

The South Breccia Outcrop Area (see Plate 4) is the most sotthern sediments (Ordovician - Tank Hill Limestone) found in the district. South of this area is found

gray Tertiary-Cretaceous volcanic rocks.

This area of silicification, silica breccia, and limestone breccia is thought to be bounded on the west by a major lineament that strikes about N. 20° W. Other lineaments intersect in this area.

The width of silicification and silica breccia is about 1,000 feet wide, and trends to the northeast (see Plate 5) towards the Bradshaw Adit.

Sulfide (pyrite) was found on the surface at 70 feet south of the collar of Diamond Drill Hole No. 1, at the location of Sample No. A-4680, in silica breccia. Diamond Drill Hole No. 1 was drilled N. 60° E. at - 45°, for a total of 424 feet. The hole was collared in silica breccia and continued in it for 17 feet. From 17 feet to 341 feet the hole was drilled in limestone breccia; and from 341 feet to 424 feet in dark gray limestone (see Diamond Drill Hole Cross-Section Plate 4).

This area is thought to be a breccia pipe, because of the rotated angular or rounded rock fragments of limestone found in the drill core. From the collar of the diamond drill hole to 50 feet iron oxide was found; from 50 feet to 104 feet a mixture of sulfides and iron oxide was found; and from 104 feet to 341 feet sulfides were found. From 314 feet to 341 feet the core averaged 0.019% copper. It is thought the total sulfide content (mostly pyrite and a little chalcopyrite) is probably in the range of 0.5 to 1.0%, thus it is thought that geophysics could be used to a good advantage in this area, and probably for the whole district.

It is to be noted that no molybdenum was found in the spectrographic analysis of sulfides from the drill core - thus this mineralized area is different from that of the Atlanta Mine.

The core of the Diamond Drill Hole No. 1 was lamped with a Mineralite SL 2537 Short Wave UV filter; at 124.5 feet a speck of blue-white scheelite was found; at 218 to 222 feet red calcite (activating agent - manganese) was found; at 246.5 feet calcite was found; and at 356 feet red calcite was found.

Mineralogy:

The ore minerals are gold and silver, occurring in sub-megascopic particles, disseminated in the matrix of the silica breccia.

At the Atlanta Mine, the silver mineral is as yet unidentified; argentite is reported from the Silver Park area.

Uraninite (identified by X-ray diffraction) was found in the Blue Bird Mine, where two carloads of development ore averaging about 0.30% U_3O_8 were shipped. At the Atlanta Mine, a sample was taken ten feet above the 100 Level on the southeast end assayed 0.137% U_3O_8 e, 0.140% U_3O_8 c, 0.04-oz. gold, and 0.90-oz. silver. The uranium is in equilibrium.

The 2,050 pound chip sample taken from the walls of the open-pit for metallurgical testing assayed 0.017% U_3O_8 c, 0.215-oz. gold, 1.38-oz. silver, 2.6% Fe, 0.72% CaO, 91.40% SiO_2, 1.00% Al_2O_3, 0.021% Pb, 0.038% Cu, 0.02% Zn, 2.84% $BaSO_4$, None % CaF_2, and 0.94% L.O.I., for a total of 100.62%. It is to be noted that 0.052-oz. platinum per ton were reported, from this same sample by Rogers Research & Analysis Co., 1009 West 5th South, West Bountiful, Utah.

The gangue minerals are silica, calcite, barite, iron oxide, and manganese oxide, as well as, partially altered blocks of limestone and dolomite. In the Atlanta Mine the greatest amount of calcite and barite are found in the vicinity of the open pit and on the 100 Level under the open-pit.

Exclusive of the Atlanta Mine, the greatest amount of vein type calcite, iron oxide, and manganese oxide were seen in a massive silica breccia zone located 1,300 feet N. 36° W. from the portal of the Bradshaw Adit (see Plate 5).

Trace elements found in samples from the Atlanta Mine include copper, lead, zinc, nickel, cobalt, vanadium, and molybdenum. These qualitative spectrographic analyses were made by Metallurgical Laboratories, 1142 Howard Street, San Francisco, 3, California.

Trace elements, in addition to those listed above, found in the 2,050 pound metallurgical sample taken from the walls of the open pit include arsenic, cadmium, rubidium, tin, tungsten, and platinum (0.052-oz. ton). These X-ray Spectrographic (Flourescence) Qualitative Analyses were made by Rogers Research.

It is to be noted that the spectrographic analyses made of sulfide bearing core from Diamond Drill Hole No. 1 (Metallurgical Laboratories) were lacking in molybdenum.

In as much as the grade of silver increases from the surface down to the 200 Level of the Atlanta Mine, it is considered possible that perhaps some of the silver has been leached from the surface croppings and a secondary enrichment of silver on the 200 Level accounts for the increase in grade. The mine down to the 400 Level is dry.

In the South Breccia Outcrop Area (see Plate 4), in the vicinity of the old shafts, pistachio-green epidote was seen in an old surface trench, and about 170 feet southeast of this exposure was found a piece of mica schist. The true significance of these occurrences is not known.

Wall rock alteration, in the district, is thought to be mainly the introduction of silica. Zones of silicification are extensive in the Tank Hill limestone, and the Ely Springs dolomite. Lesser amounts of silicification is found in the Eureka quartzite, the Laketown dolomite, and the Simonson dolomite.

Blocks of Ely Springs dolomite, in close proximity to the silica breccia apparently have been altered by the addition of iron. The block of Brown dolomite east of the Atlanta open-pit (see Plate 1) is thought to be a good example; also, the block of bron dolomite above the Bradshaw silica breccia zone (see Plate 3) is thought to be another good example.

Bleaching of rocks has been seen in the zone west of the portal of the Bradshaw Adit (see Plate 3), and in the fault zone at the Hulse Shaft (see Plate 5). White, yellow, and reddish colores are common in these areas.

The rhyolite that forms the hanging-wall ot the ore-breccia-zone of the Atlanta Mine is a soft, bleached rock.

The district is thought to have a mineral zoning. There is an apparent increase in silver from the Atlanta Mine to the Bradshaw Adit area; and, a further increase in silver values towards the Silver Park area. Uranium also appears to increase to the south from the Atlanta Mine towards the Blue Bird Mine and the Earl Rath property.

The surface croppings of the silica breccia, east of the Atlanta Shaft, show what are thought to be distinct zones of different colored matrix (see Plate 2).

Sample values from "Assay Map - Atlanta Mine, 6/22/58", indicate that the different colored breccia matrix carry different values in gold and silver:

1. Tax Matrix breccia (east of open pit) - 0.46-oz. gold and 0.85-oz. silver

2. Tax matrix breccia (east of shaft) - 0.30-oz. gold and 1.05-oz. silver

3. Dark Gray Matrix breccia (east of shaft) - 0.25 to 0.33-oz. gold and 0.50 to 0.95-oz. silver

4. Brown Matrix breccia (east of shaft) - 0.16 to 0.18-oz. gold and 1.15 to 1.40 oz. silver

5. Gray Matrix breccia (east of shaft) - 0.12 to 0.22-oz. gold and 0.80 to 0.90-oz. silver

6. Gray Matrix breccia (east of shaft) - (weathers tan color 0.08 to 0.13-oz. gold and 0.40 to 0.80-oz. silver

7. Black Matrix breccia (east of shaft) - 0.09-oz. gold and 1.30-oz. silver

8. Light Gray Matrix breccia (east of shaft) - 0.02 to 0.11-oz. gold and 0.60 to 1.30-oz. silver

It is postulated these different colored silica matrix zones represent different stages of mineralization - if this be so, then there are possibly more than ten stages of mineralization at the Atlanta Mine area, with the calcite and barite being the most recent.

The paragensis of the minerals in the district is not known.

CONCLUSIONS:

1. Study of the aerial photographs reveal numerous lineaments. It is thought these features are the result of faulting.

2. It is thought brecciation in the breccia pipes of the district occur at the intersection of major faults and preceded the silicification. Silicified areas and silicified breccia pipes are parallel to major fault systems.

3. The breccia pipes of the Atlanta Mine and the Bradshaw Adit are thought to have been intruded, since fragments of the underlying Eureka quartzite accompany silicified fragments of dolomite and limestone.

4. Gold, silver, uranium, copper, and platinum are found in the breccia pipes.

5. The district is zoned - with an increase of silver to the south and to the southwest, from the Atlanta Mine.

6. The district is zoned - with an increase of uranium to the south, from the Atlanta Mine.

7. Pyrite and chalcopyrite were found in the unsilicified limestone breccia in the core of Diamond Drill Hole No. 1.

8. The underground workings at the Bradshaw Adit are thought to be a finger from a larger breccia pipe 160 feet north of the portal of the adit.

9. For the Atlanta Mine:
(a) The southward extension of the Atlanta-Breccia-ore-body has been offset to the east about 130 feet by faulting.

(b) North trending faulting has cut diagonally across the Atlanta-Breccia-ore-body. The west side has dropped. In the northern part of the mine, this fault zone has been used as the footwall of the Atlanta-breccia-ore-body ore reserves. It is thought the greater portion of the Breccia-ore-body lies to the east of the fault.

(c) The gold, silver, uranium, and platinum bearing Breccia-zones of the Atlanta Mine are thought to dip to the east.

(d) The width of the Atlanta-Breccia-ore-body is not known. It is thought the Atlanta-Breccia-ore-body is in excess of 200 feet; and could be in excess of 300 feet wide, if a horse of brown dolomite is included.

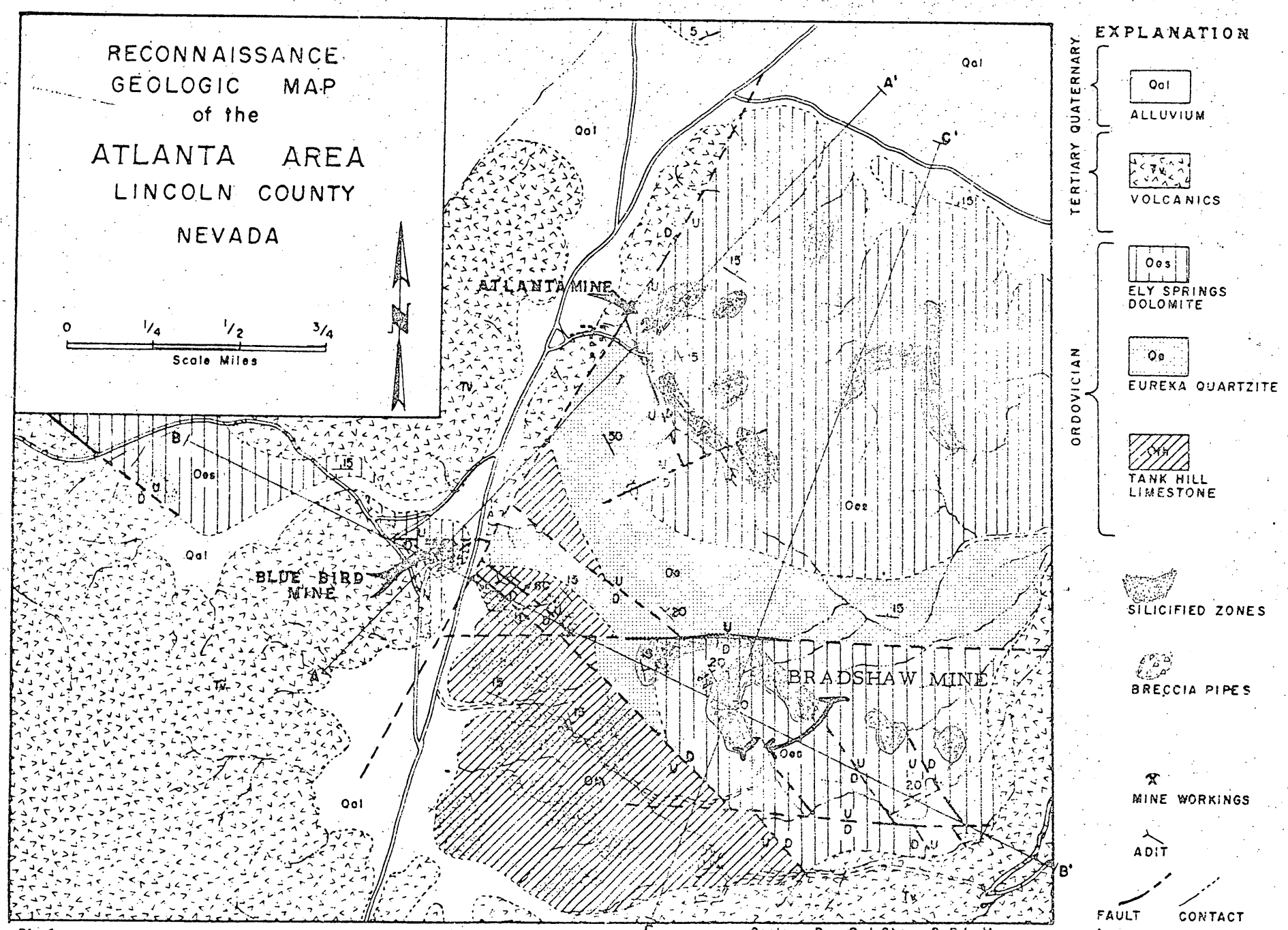
(e) The length of the Atlanta-Breccia-ore-body is not known. It is thought to be in excess of 1,100 feet.

(f) It is thought, at the Atlanta Mine, there are POSSIBLE ore reserves in excess of 6,000,000 tons; length greater than 1,100 feet, width 300 feet plus, depth from surface 200 feet plus.

RECOMMENDATIONS:

1. Bulk sample croppings east of GREEN LINE (footwall of Atlanta ore reserves) shown on Plates 1 and 2.
2. Prospect the area east of the fault on the footwall of the Atlanta ore reserves - to change POSSIBLE ore reserves into DEVELOPED ore reserves.
3. Bulldoze access roads above the Bradshaw Adit and northeast from the Bradshaw to the Atlanta Mine. Bulk sample the Bradshaw croppings.
4. Contract a geophysical program to determine sulfide concentrations for the district.
5. Bulldoze access roads into the silicified area of the Silurian sediments - east of the Atlanta Mine. Stake claims in the area.
6. Acquire the Dick Knight patented claims in Silver Park.
7. Finish the study of the geology of the Atlanta Mine area and of the district.
8. Have Mr. Huch of the Galigher Company make a concentrate of heavy minerals from the open-pit metallurgical sample. Assay the concentrate for gold, silver, uranium, and platinum.

Harry E. Nelson
Registered Geological Engineer
Nevada Regis. No. 891
September 14, 1965

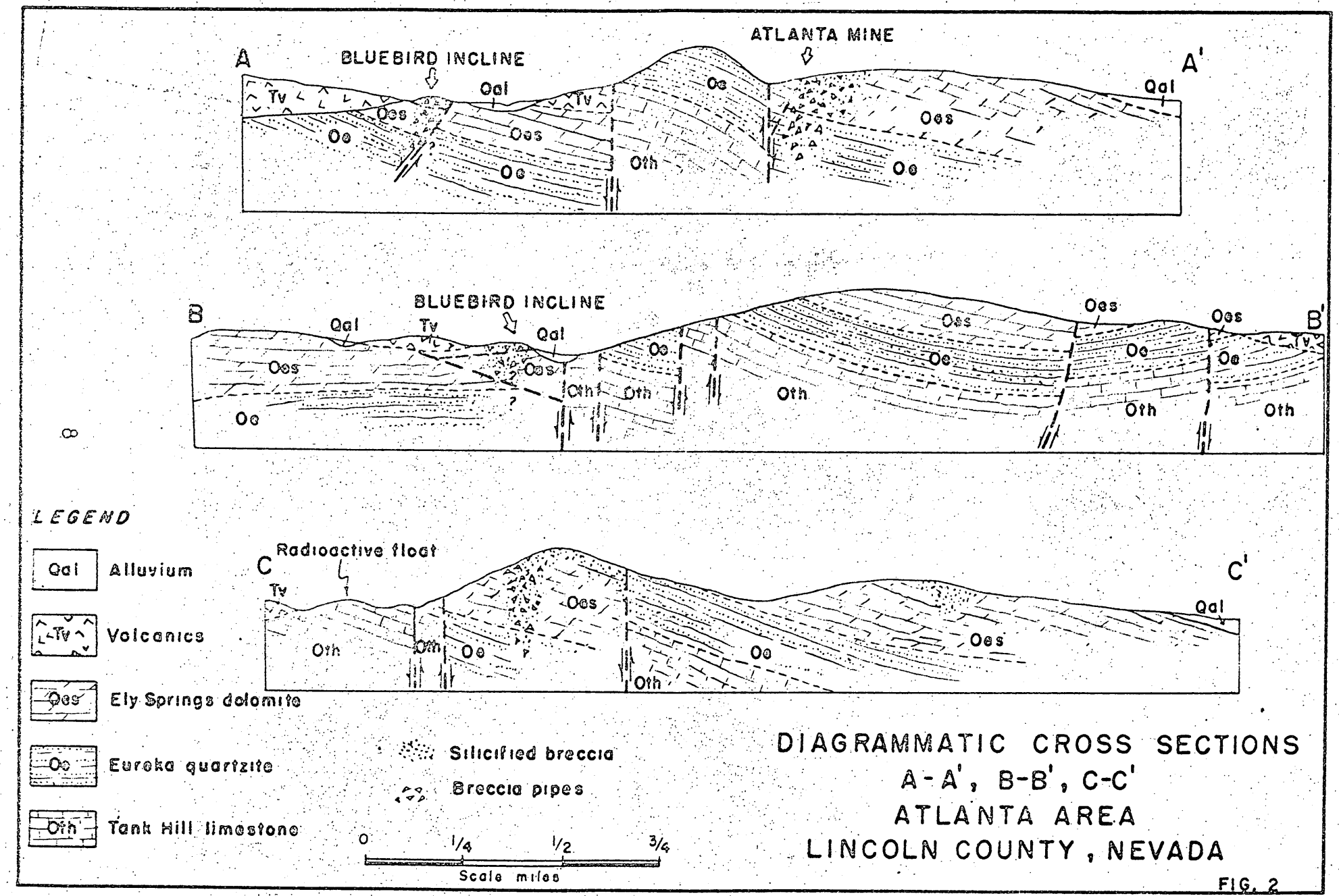


PL. 1

Geology By — B. J. Sharp & B.L. Myerson

EXHIBIT A-3(e)

A & B GOLD-SILVER MINES, INC
POST OFFICE BOX 418
PIOCHE, NEVADA



DIAGRAMMATIC CROSS SECTIONS
A-A', B-B', C-C'
ATLANTA AREA
LINCOLN COUNTY, NEVADA

FIG. 2

EXHIBIT B-3(e)

A & B GOLD-SILVER MINES, INC.
POST OFFICE BOX 418
PIOCHE, NEVADA 89043

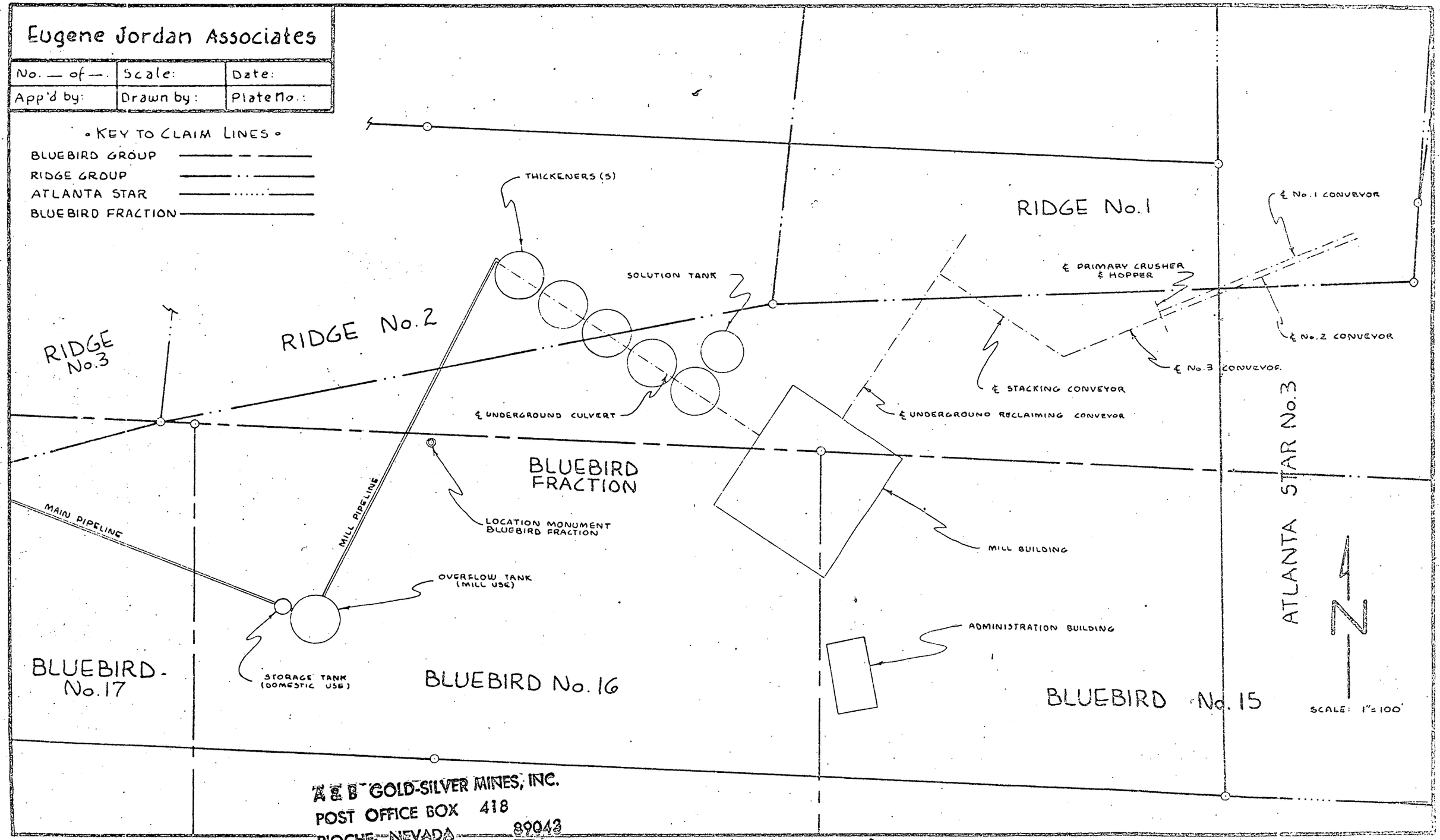
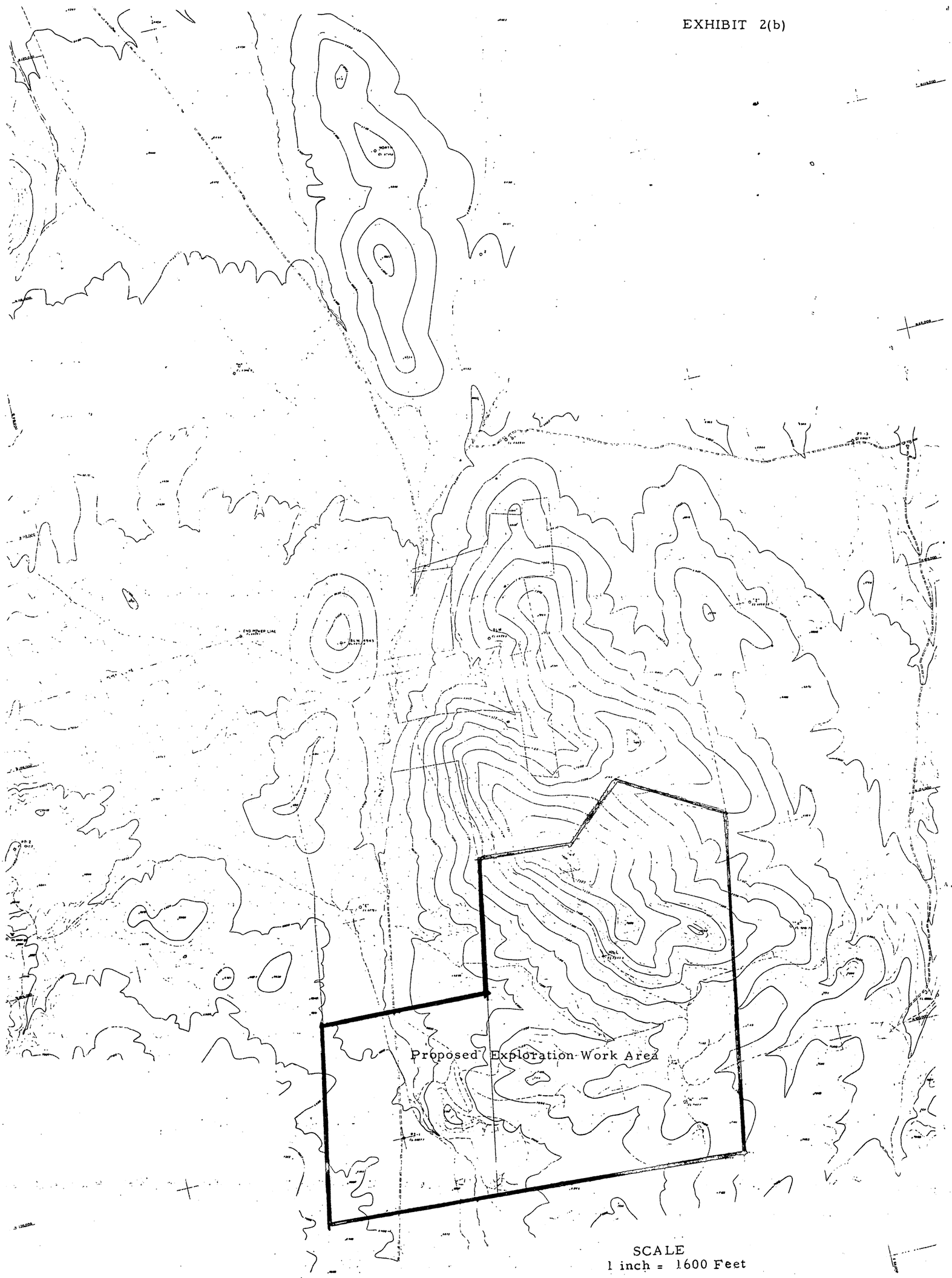

Eugene Jordan Associates
No. — of —.
Scale:
Date:
App'd by:
Drawn by:
Plate No.:
• KEY TO CLAIM LINES •
BLUEBIRD GROUP
RIDGE GROUP
ATLANTA STAR
BLUEBIRD FRACTION
THICKENERS (5)
SOLUTION TANK
RIDGE No.1
℄ No.1 CONVEYOR
℄ PRIMARY CRUSHER & HOPPER
℄ No.2 CONVEYOR
℄ No.3 CONVEYOR
℄ STACKING CONVEYOR
℄ UNDERGROUND RECLAIMING CONVEYOR
RIDGE No.2
RIDGE No.3
℄ UNDERGROUND CULVERT
BLUEBIRD FRACTION
ATLANTA STAR No.3
MAIN PIPELINE
MILL PIPELINE
LOCATION MONUMENT BLUEBIRD FRACTION
MILL BUILDING
OVERFLOW TANK (MILL USE)
ADMINISTRATION BUILDING
BLUEBIRD No.17
STORAGE TANK (DOMESTIC USE)
BLUEBIRD No.16
BLUEBIRD No.15
SCALE: 1"=100'
A & B GOLD-SILVER MINES, INC.
POST OFFICE BOX 418
PIOCHE, NEVADA 89043

Exhibit 3(a)

EXHIBIT 2(b)



SCALE
1 inch = 1600 Feet

Aerial-Photo-Topo Map
ATLANTA MINING DISTRICT

EXHIBIT 2(b)

CONTOUR INTERVAL 20 FEET

ATLANTA MINE

A & B GOLD-SILVER MINES, INC
POST OFFICE BOX 418
PIOCHE, NEVADA

GEOLOGY AND ORE RESERVES
ATLANTA MINE
LINCOLN COUNTY, NEVADA

By Peter Joralemon October 31, 1966

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A & B GOLD-SILVER MINES, INC.
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PIOCHE, NEVADA 89043

GEOLOGY AND ORE RESERVES
ATLANTA MINE
LINCOLN COUNTY, NEVADA

SUMMARY AND CONCLUSIONS

The Atlanta gold deposit in eastern Lincoln County, Nevada, was discovered in 1905 and was partially developed by a series of underground workings during the past 25 years.

The Atlanta mine was optioned by Deep Sand Petro-Energy Developments, Inc., in 1965, from which company it was acquired by Eugene Jordan Associates; which company assigned and transferred same to A & B Gold-Silver Mines, Inc., a Nevada Corporation, the present owner.

A cyanide plant rated at about 500 tons a day capacity was installed a year ago and mining commenced early in the Spring of 1966. The mine is temporarily idle, pending the installation of a tertiary crusher and the enlargement of the plant to 1500 ton capacity.

During the 5 month active period the mine produced 27,000 tons of surface ore containing a total of about 0.15 oz. Au and 0.69 oz. Ag per ton, from which 0.137 oz. Au and 0.172 oz. Ag per ton were recovered. The gold recovery during this period was excellent. It is seldom possible to recover the last half ounce of silver per ton in a cyanide mill and it is unlikely that the silver recovery will improve until improved silver values are reached at greater depth.

The Atlanta ore body is a large lenticular mass of intensely silicified dolomite breccia lying at the fault contact of the dolomite and younger rhyolite volcanics. The deposit, which stands out as a prominent knob, dips with the hillside at about 45°. It is ideally suited for open pit mining, with a waste:ore ratio of about 1.5:1.

Gold ore in the Atlanta deposit has been partially developed by two underground levels 100 feet apart, and a series of surface drill holes for a length of 700 feet and an inclined depth of over 400 feet. The ore deposit is fan shaped in cross-section, 30 to 50 feet wide near the base of development and flaring to a width of nearly 150 feet near the surface. The southern ore limit has been determined by underground workings, but ore continues an unknown distance north of the workings.

The ore body is delineated by crosscuts driven at approximately 100 foot intervals along one major and three minor underground levels. Samples have been taken along these crosscuts by numerous

mining companies. The grade of ore reserves used in the present reserve estimate was calculated by averaging the various sample values from each crosscut. The data and the system used in my grade calculations are discussed in detail in the Reserves section of this report.

Reserves are classified as probable rather than proven because of the substantial gaps in information and because the various sample results show erratic variations. It is unlikely that additional development work would change the reserves by more than 10% in either direction from those cited in my estimate.

In calculating reserves the Atlanta ore body has been subdivided into four tiers of three blocks each, with at least one crosscut or sample line from which to establish ore grade. The tonnages in the twelve blocks were calculated by areal measurements in cross sections.

The Atlanta orebody contains 1,452,000 tons of probable ore, averaging 0.142 oz. Au and 1.68 oz. Ag, having a gross value of $7.12 a ton, or a recoverable value of $6.04 a ton.

The Atlanta ore shows a regular variation in gold:silver ratio with depth, ranging from 1:6.7 in the near surface ore to 1:20.3 at the base of the ore block. The recoverable ore value also increases from $5.60 a ton in the shallow ore blocks to $6.49 a ton in the deepest blocks.

There is a chance to develop additional ore along the north extension of the Atlanta ore body. Several other silicified breccia lenses within a mile of Atlanta contain low gold-silver values in the outcrops and deeper exploration may develop other ore bodies similar in nature to the Atlanta.

INTRODUCTION

The Atlanta Mine is located in northeastern Lincoln County, Nevada, about 48 miles northeast of Pioche and 12 miles west of the Utah state line. It is accessible by good graded roads leading both to Pioche and to Ely. A landing strip 3 miles north of the mine was designed to receive twin engine aircraft.

The property is in rollling, cedar-covered foothills at an elevation of about 6800 feet. The climate is semi-arid and winters are harsh but of short duration. Annual snowfall varies from one to four feet and temperatures drop well below zero for several weeks in mid-winter. Summer temperatures are moderate and rainfall is sparse.

Water for camp and mill is pumped for 9 miles against 700 feet of static head. The well, currently producing 350 gpm, is said to have a substantially higher capacity.

Electric power is supplied to the mine at the 3000 KUA capacity Atlanta mine substation.

In 1959 I examined the Atlanta mine on behalf of Northfield Mines. At that time I supervised a bulk sampling program to check ore grade estimates made by a series of earlier engineers and geologists.

In 1962 I again examined the property for McKinney Mines Ltd. The decision was then made to expand the underground development to the lateral limits of the ore. Three hundred feet of drifts and crosscuts and nearly 500 feet of raises were driven under my supervision.

In the course of my two examinations I studied in detail all previous reports and attempted to correlate my findings with others.

HISTORY AND DEVELOPMENT

The Atlanta mine was discovered in 1905, but attracted little attention for many years because it lacked the rich silver and gold values for which early exploration was aimed.

Ownership of this property went to the Atlanta Gold and Uranium Company or its predecessor, Richmond Chemical Company, about 25 years ago. The Atlanta mine was optioned by Deep Sand Petro-Energy Developments, Inc., in 1965, from which company it was acquired by Eugene Jordan Associates; which company assigned and transferred same to A & B Gold-Silver Mines, Inc., a Nevada Corporation, the present owner.

Open pit mining was started by the present owners in the Spring of 1966, and the ore was treated in a 350 ton per day cyanide mill on the property. From Spring to the temporary shutdown a month ago, the

mine produced 27,000 tons of ore averaging 0.137 oz. Au (recovered) and 0.172 oz. Ag.

The Atlanta orebody was developed by two levels 100 feet apart, serviced by a 2-compartment vertical shaft sunk to a depth of 400 feet. A third level at the shaft bottom was driven toward the ore body, but was discontinued without developing the ore at that horizon. Over 3000 feet of drifts and crosscuts partially developed the orebody along a strike length of 850 feet and a depth of 200 feet. The geology of the main workings, mapped during my earlier examinations, is shown on the accompanying plan.

Practically no surface exploration work has been done away from the area of underground development.

During the past 25 years the property has been examined by engineers representing numerous mining companies and financing groups. The earliest known work was done by C. E. Collins of the Atlanta mine. He drove crosscuts through the ore at about 100 foot intervals along the 100 and 200 foot levels, sending muck from the ore zone to the McGill smelter of Kennecott Copper Corporation. Later detailed sampling and/or drilling programs were carried out by Camp Bird, Minerals Engineering, Northfield Mines, Hoover Construction Company, McKinney Mines, and the Reconstruction Finance Co. Earlier work was planned to prove tonnage and grade within the developed block. McKinney's work was designed to determine the possible extent of ore beyond the limits of prior development.

GEOLOGY

The Atlanta mine area is underlain by Ordovician Tank Hill dolomite, Eureka quartzite, and Ely Springs dolomite. All formations are unconformably capped by mid-Tertiary rhyolite, rhyolite tuff, and obsidian. The various rock types are cut by narrow rhyolite and andesite dikes.

The sediments have a regional northwest strike and dip moderately to the northeast. Intense folding is generally absent.

The Atlanta district is dissected by a series of northeast and northwest faults. Both sediments and volcanics are cut by the faults, and the principal movement is apparently post-middle Tertiary and pre-ore (late Tertiary?).

Zones of intense brecciation have been developed in all rock types along the faults and are particularly prominent in the Ely Springs dolomite.

ATLANTA MINE GEOLOGY

The Atlanta ore body is a large breccia lens in dolomite striking N 20°W and dipping at from 35° to 60° to the west. A down-faulted block of rhyolite lava and tuff forms the hanging wall of the breccia lens along most of its length. The ore body is cut by several narrow rhyolite dikes.

A series of smaller breccia lenses parallel the Atlanta deposit and form prominent outcrops in the dolomite to the east. Although these other lenses have been intensely silicified none are known to contain commercial amounts of gold or silver.

The Atlanta ore lens varies in width from 50 to nearly 150 feet and averages about 70 feet. As shown in the accompanying cross-sections, the deposit is somewhat fan-shaped, maintaining a more or less uniform thickness in the deeper levels and flaring abruptly near the surface.

The south end of the ore body has been clearly delineated on the 200 level. To the north, a narrow portion of the ore body continues beyond the limits of underground development, maintaining average grade.

The 400 level cut the mineralized body in only one crosscut and there explored only 18 feet of the total undetermined vein width. This deeper work suggests, but does not prove that the Atlanta ore lens is in the form of a horizontal pipe about 300 feet deep and 700 feet long.

MINERALIZATION

The most prominent feature of the Atlanta mineralization is the intense silicification of the dolomite breccia. Much of the ore contains over 90% SiO_2, but the breccia texture has been largely preserved.

The ore body has been oxidized to the level of the deepest workings and remnants of pyrite can be seen only rarely in the ore. The breccia is moderately iron-stained and some pyrolusite is present, particularly in the altered footwall andesite dike. Moderate amounts of barite occur throughout the ore body.

Gold and silver are the only economic minerals in the deposit and are more or less uniformly disseminated through the explored portion of the ore body. The gold-silver ore is enclosed on either end of the breccia lens by a shell of barren or nearly barren silicified breccia.

The average gold content of the ore decreases slightly with

depth and the silver content increases so that the gold:silver ratio varies from 1:6.7 near the surface to 1:20 at the deepest developed level. These variations are such that the gross value of the ore increases slightly with depth. Local wide deviations from the average gold:silver ratio suggest that these metals occur in separate minerals rather than in the alloy electrum.

Uranium occurs sparsely in the breccia and footwall andesite and the average uranium content of the gold ore body has been estimated at about 0.05% U_3O_8. In the following sections, the possible value of uranium has not been considered.

ORE RESERVES, ATLANTA MINE

The Atlanta orebody has been partially developed by two major levels, the 100 and 200 levels, in which crosscuts have been driven through the ore zone at approximately 100 foot intervals. In addition to underground work the outcropping portion of the deposit has been tested by chip sampling across the ore at about 50 foot intervals. The recent 27,000 ton production of surface ore represents a more complete sampling of the outcropping portion of the ore body.

For the purpose of calculating reserves the developed portion of the Atlanta orebody has been subdivided into four vertical tiers of three blocks each, so that each of the resulting twelve blocks contains at least one crosscut or line of surface samples. These blocks are shown on the accompanying longitudinal projection.

The Atlanta orebody, developed by crosscuts and a few inclined raises, cannot be considered as proven or fully developed. However, it is extremely unlikely that additional development work will appreciably alter either the grade or tonnage given in my reserve estimate. I have classified all ore in the Atlanta ore body as "probable", and believe that my figures are within 10% of the actual size and grade of this ore body.

Probable ore has been assumed to extend 50 feet vertically below the 200 level, 50 feet north of the north face of the 200 level, and 30 feet south of the No. 7 raise on the 200 level. Drill results have been used to establish thickness of ore where underground information is inadequate. In no place have drill results been used to determine ore grade, as the ore is so badly broken and vuggy as to prevent a reliable recovery of core or drill cuttings.

Areal measurements on sections drawn at 50 foot intervals across the orebody were calculated by scale rather than planimeter and the calculations are by slide rule, which is within the limits of accuracy of the underlying data.

A factor of 12.5 cubic feet to the ton of ore in place has been used in all tonnage calculations.

TONNAGE

Tonnages of the various blocks are given below:

Block A-I	200,000	tons
A-II	134,000	"
A-III	94,000	"
B-I	140,000	"
B-II	118,000	"
B-III	90,000	"
C-I	69,000	"
C-II	145,000	"
C-III	92,000	"
D-I	28,000	"
D-II	190,000	"
D-III	152,000	"
Total Tonnage of Probable Ore:	1,452,000	"

The ore body extends an unknown distance north of the developed block but, as nothing is known of this, it is impossible to assign any figure for possible ore beyond that classified as probable.

Based on available information it is reasonable to assume that development to the north of the probable ore body will add tonnage to the reserves at the rate of about 1500 tons per foot of advance. Below the 250 foot base of probable ore, deeper work may develop 3700 tons of additional ore per vertical foot.

STRIPPING RATIO

In calculating the stripping ratio the assumptions are made that (1) an average pit slope of 55° can be maintained in the hanging wall waste; and (2) that the footwall will stand with no benching.

The waste:ore ratio in tons for the probable ore block to the 250 foot horizon is 1.4:1. If deeper ore is developed, the ultimate stripping ratio may approach 2:1.

GRADE OF PROBABLE ORE

Sampling

The crosscuts on the 100 and 200 levels have been channel sampled by from 2 to 3 different groups and bulk sampled by from 2 to 5 groups. As previously mentioned, I supervised the Northfield bulk sampling program in 1959.

The bulk samples, ranging from a few tons to total muck from each crosscut, were shipped to the McGill sampling plant and purchased by Kennecott as siliceous flux. Atlanta Gold and Uranium is reported to have shipped total muck from each crosscut as bulk samples.

The results of the various sampling programs are given in the following table:

Location	Sample	Type Sample	Au (oz.)	Ag (oz.)
Old open pit	Altanta	15,000 ton shipment	0.330	1.24
New pit	Eugene Jordan Assoc.	27,000 tons milled	0.150	0.69*
Surface,)	RFC and Collins	Chip	0.136	1.07
new pit area)	Weighted average, channel and bulk samples, surface		0.145	0.82
100 Level 1-xc	Atlanta	Channel	0.09	0.66
	RFC (L. Gordon)	Channel	0.124	0.85
	Hoover	Channel	0.272	1.20
	Average of Channels		0.162	0.90
	Atlanta	Total muck	0.176	0.50
	Camp Bird	Bulk	0.506	0.98
	Minerals Engineering	Bulk	0.15	3.82
	Northfield	Bulk	0.14	0.72
	Hoover	Bulk	0.20	0.99
	Average bulk samples		0.234	1.40
	Weighted Average Channel and Bulk Samples		0.210	1.23
100 Level 2-xc	Atlanta	Channel	0.10	1.98
	RFC	Channel	0.104	2.22
	Hoover	Channel	0.068	1.01
	Average Channel Samples		0.091	1.74
	Atlanta	Total muck	0.10	1.98
	Camp Bird	Bulk	0.137	2.30
	Hoover	Bulk	0.06	1.02
	Average bulk samples		0.099	1.77
	Weighted Average Channel and Bulk Samples		0.096	1.76

*Calculated from mint returns by assuming 91% gold recovery and 25% silver recovery.

Location	Sample	Type Sample	Au (oz.)	Ag (oz.)
100 Level 3-xc	Atlanta	Channel	0.11	1.28
	RFC	Channel	0.141	1.31
	Average Channel Samples		0.125	1.29
	Camp Bird	Bulk	0.07	0.81
	Minerals Engineering	Bulk	0.08	2.38
	Northfield	Bulk	0.08	1.28
	Average Bulk Samples		0.08	1.46
	Weighted Average Channel and Bulk Samples		0.102	2.26
82 Level	Atlanta	Total muck	0.17	0.97
200 Level N Raise	McKinney	Channel and grab	0.16	0.99
200 Level 1-xc	Atlanta	Channel	0.086	3.63
	RFC	Channel	0.079	3.16
	Average Channel Samples		0.083	3.39
	Atlanta	Total muck	0.14	3.60
	Camp Bird	Bulk	0.11	3.86
	Northfield	Bulk	0.07	3.40
	Average Bulk Samples		0.099	3.54
	Weighted Average Bulk and Channel Samples		0.094	3.49
200 Level 2-xc	Atlanta	Channel	0.10	2.07
	RFC	Channel	0.095	1.83
	Hoover	Channel	0.09	2.40
	Average Channel Samples		0.095	2.10
	Atlanta	Total muck	0.17	2.10
	Camp Bird	Bulk	0.082	2.99
	Northfield	Bulk	0.09	1.80
	Hoover	Bulk	0.08	2.34
	Average Bulk Samples		0.105	2.31
	Weighted Average Channel and Bulk Samples		0.102	2.26

Location	Sample	Type Sample	Au (Oz.)	Ag (Oz.)
200 Level 3-xc	Atlanta	Channel	0.11	3.03
	RFC	Channel	0.114	3.26
	Hoover	Channel	0.106	2.96
	Average Channel Samples		0.11	3.08
	Atlanta	Total muck	0.227	0.87
	Camp Bird	Bulk	0.125	3.91
	Hoover	Bulk	0.08	4.16
	Average Bulk Samples		0.133	2.79
	Weighted Average Channel and Bulk Samples		0.125	2.89
200 Level 4-xc	Atlanta	Channel	0.07	4.42
	RFC	Channel	0.066	4.09
	Hoover	Channel	0.100	2.82
	Average Channel Samples		0.079	3.78
	Atlanta	Total muck	0.15	1.28
	Camp Bird	Bulk	0.085	1.14
	Hoover	Bulk	0.05	3.79
	Average Bulk Samples		0.095	2.07
	Weighted Average Channel and Bulk Samples		0.090	2.64
200 Level 5-xc	Atlanta	Channel	0.23	3.07
	RFC	Channel	0.228	3.07
	Hoover	Channel	0.145	1.85
	Average Channel Samples		0.201	2.70
	Atlanta	Total muck	0.22	3.41
	Camp Bird	Bulk	0.195	3.24
	Northfield	Bulk	0.17	3.41
	Hoover	Bulk	0.12	3.25
	Average Bulk Samples		0.176	3.33
	Weighted Average Channel and Bulk Samples		0.189	3.01
200 Level 410 Rs	Hoover	Channel	0.138	2.50
	Hoover	Total muck	0.13	2.45
	Weighted Average Channel and Bulk Samples		0.133	2.47

Location	Sample	Type Sample	Au (oz.)	Ag (oz.)
200 Level 6-xc	Atlanta	Channel	0.11	2.46
	RFC	Channel	0.105	2.46
	Average Channel Samples		0.107	2.46
	Atlanta	Total muck	0.106	2.73
	Camp Bird	Bulk	0.170	2.42
	Average Bulk Samples		0.138	2.58
	Weighted Average Channel and Bulk Samples		0.128	2.54
200 Level 7 Rs	McKinney	Channel and grab	0.153	0.90

A comparison of the values in the various crosscut samples shows that the ore is so erratic as to allow no absolute agreement between samples. The inconsistent results of bulk sampling suggest that metal values may be concentrated in zones transverse to the vein in such a way that adjacent sample channels may vary widely in metal content.

There is no reason to doubt that the bulk samples contained indicated values, since the ore was purchased by Kennecott at those values. There is some cause to question how representative the bulk samples may be. Logically the largest bulk samples should be most representative, and in most instances the Atlanta bulk samples, reported to be the largest, are considerably higher in gold content than either the channel samples or the other bulks.

To arrive at a conservative estimate of grade, all bulk samples from various crosscuts have been weighted equally. The ore grade accepted for each crosscut and for the ore blocks represented by each crosscut has been calculated by allowing twice the weight for the average bulk sample values as for average channel samples.

SUMMARY OF ORE RESERVES, ATLANTA MINE

In the following table the ore values in the twelve ore blocks are given, first, as indicated by chip and channel samples; second, as indicated by bulk sampling; and third, as indicated by weighted average of bulk vs. channel samples as previously discussed.

ORE RESERVES

Block	Probable Tons	Channel Samples oz. Au	Channel Samples oz. Ag	Bulk Samples oz. Au	Bulk Samples oz. Ag	Accepted oz. Au	Grade(1) oz. Ag	Gross(2) Value/Ton	Net Value(3) per ton
A-I	200,000	0.142	0.75	0.142	0.75(4)	0.142	0.75	$ 5.93	$ 4.84
A-II	134,000	0.162	0.90	0.234	1.40	0.210	1.23	8.92	7.62
A-III	94,000	0.108	2.57	0.099	3.54(5)	0.116	2.65	7.47	6.47
Total & Avg. "A" Block	428,000	0.141	1.20	0.161	1.56	0.157	1.32	7.20	6.06
B-I	140,000	0.134	1.32	0.134	1.32(4)	0.134	1.32	6.40	5.32
B-II	118,000	0.091	1.74	0.099	1.77	0.096	1.76	5.61	4.67
B-III	90,000	0.095	2.10	0.105	2.31	0.102	2.26	6.48	5.35
Total & Avg. "B" Block	348,000	0.110	1.69	0.114	1.74	0.113	1.71	6.15	5.13
C-I	69,000	0.150	2.00	0.337	1.01(6)	0.241	1.34	10.18	8.78
C-II	145,000	0.125	1.29	0.138	1.57	0.134	1.48(7)	6.61	5.53
C-III	92,000	0.094	3.45	0.118	2.35	0.110	2.72	7.36	6.37
Total & Avg. "C" Block	306,000	0.120	2.10	0.176	1.68	0.151	1.81	7.64	6.49
D-I	28,000	0.135	1.04	0.135	1.04(4)	0.135	1.04	6.04	5.00
D-II	190,000	0.141	1.57(8)	0.139	1.85	0.141	1.72	7.14	6.06
D-III	152,000	0.147	2.10	0.144	2.65(9)	0.146	2.40	8.20	7.10
Total & Avg. "D" Block	370,000	0.144	1.74	0.141	2.11	0.143	1.95	7.52	6.42
Grand Total	1,452,000	0.130	1.64	0.148	1.77	0.142	1.68	7.12	6.04
Gross Value		$6.66		$7.48		$7.12			
Net Value		5.62		6.34		6.04			

See next page

(1) Where bulk and channel samples are available, double weight is given bulk samples.

(2) Price of $35.00/oz Au and $1.29/oz Ag is accepted.

(3) Net value calculated by assuming: 91% recovery of gold;
0.5% Ag lost in tailings.

(4) No bulk samples taken. Channel samples accepted.

(5) Bulk sample from No. 1-xc only.

(6) Grade of 15,000 tons shipped from old open pit.

(7) Include 82 Level bulk with 100 Level 3-xc samples.

(8) No data on D-II block. Values interpolated from Blocks D-I and D-III.

(9) No bulk sample from No. 7 Raise.

The ore grade calculations based on the two sets of data show a fairly close correlation. The accepted grade represents a conservative estimate.

A study of the various blocks where both channel and bulk samples have been taken shows that the average gold value in the bulk samples is 117% of the average in the channels, and the average silver content in the bulks is 105% of that in the channels.

If the ore values in Blocks A-I, B-I, D-I and D-II are recalculated by applying these percentage factors to the channel sample results, and if the accepted grade for the other blocks is used, the average grade of the 1,452,000 tons becomes 0.150 oz. Au and 1.67 oz. Ag with a gross value of $7.40, as compared to the accepted grade value of $7.12. These calculations are based on unproven assumptions, so are not used in my estimate. They are useful as an indication that the actual ore grade may be expected to exceed the value accepted in the estimate.

The variations in silver and gold with depth are presented below in tabular form. Average ore grades are given for each of the three horizontal block divisions.

Block	Tons	Oz. Au	Oz. Ag	Net Value	Au:Ag
Division I (Upper)					
A-I	200,000	.142	.75		
B-I	140,000	.134	1.32		
C-I	69,000	.241	1.34		
D-I	28,000	.135	1.04		
Total & Avg.	437,000	0.155	1.04	$5.60	1:6.7
Division II (Middle)					
A-II	134,000	.210	1.23		
B-II	118,000	.096	1.76		
C-II	145,000	.134	1.48		
D-II	190,000	.141	1.72		
Total & Avg.	587,000	0.146	1.56	6.02	1:10.7
Division III (Lower)					
A-III	94,000	.116	2.65		
B-III	90,000	.102	2.26		
C-III	92,000	.110	2.72		
D-III	152,000	.146	2.40		
Total & Avg.	428,000	0.123	2.50	6.49	1:20.3

The gold content decreases with depth, the silver content increases considerably, and the recoverable value increases to some extent. Because of the shallow-seated characteristics of the ore body, I do not expect the values to continue further than 100 feet below the base of the probable ore. 250 + 100 = 350

Peter Jackson

October 31, 1966

Recd. W. O.
12/29/67

FINAL REPORT

DRILLING PROGRAM

ON

A & B GOLD-SILVER MINES, INC. PROPERTY

Lincoln County, Nevada

Ted L. Hanks

November 1967

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PRELIMINARY EXAMINATION
ATLANTA & BRADSHAW MINES & ADJACENT AREAS
A & B GOLD-SILVER MINES, INC.
Lincoln County, Nevada

INTRODUCTION

Purpose and Scope

The object of this investigation was to evaluate silicified zones south of the Atlanta Mine in the hope of locating additional gold-silver ores that could be processed with the Atlanta reserves through existing mill facilities. To attain this objective A & B Gold-Silver Mines, Inc. applied for federal assistance through the Office of Minerals Exploration (OME). Participation by the government, contract No. OME-6611, with the company consists of a planned drilling program of 10 diamond drill holes each to a depth of 500 feet and the associated dozer work, assays and supervisory expenses.

Present Investigations

With the granting of the OME loan, bids for the diamond drilling were solicited and eventually E. J. Longyear Company of Minneapolis, Minnesota was awarded the contract. The first rig was mobilized and started drilling test hole one (TH-1) on August 30, 1967. By the 18th of September a second rig had arrived and drilling was begun on TH-7.

The tenth and final hole was completed on November 10 and by December 1 the entire program was terminated with only about one-half of the intended footage having been drilled.

Concurrent with the drilling, a geological evaluation of the Atlanta-Bradshaw areas was undertaken which included a compilation of a geologic map and surface sampling of potential target areas. These data are shown on Plate AB-2, in pocket at end of report.

DRILL HOLE DATA

General Statement

Outlined in the OME contract was approximately 5000 feet of diamond drilling, 10 holes each 500 feet deep. In performance the total footage drilled amounted to 2497.5 feet. Only TH-1 was drilled to the planned depth of 500 feet.

The holes were not drilled consecutively and as is noted some numbers are missing as a result of prior numbering and selection of sites. Hole locations can be seen on the accompaning map (Plate AB-2).

Tabulated below are the drill holes and their respective depths:

	Drill Hole No.	Total Depth (ft.)
	TH-1	503
	TH-2	266
	TH-3	145
	TH-4	167
	TH-5	151
	TH-7	281
	TH-10	342
	TH-12	117.5
	TH-14	202
	TH-15	323
TOTALS	10 holes	2497.5 feet

Drilling Evaluation

Of the 154 samples submitted for assay to Union Assay Office, Inc. and Pioche Assay Office, 125 samples were from drill core while the remaining 29 samples were collected from favorable outcrop throughout the subject area. A summary of all samples and their distribution are shown in Tables I, II and III. Sampled intervals or locations are found either on the drill logs or Plate AB-2; assay reports are in the appendix.

An appraisal of the assay data shows that small amounts of gold, and to a lessor extent silver, are found scattered throughout the area in

TABLE I: SUMMARY - DRILL HOLE SAMPLES
Bradshaw Area

Hole No.	Sample No. - Union Assay		Sample No. - Pioche Assay	
TH-1	B-1 to B-36 B-46 to B-48 B-50 B-61 & B-65 Total Samples	47	B-51 to B-53	3
TH-2	B-99 to B-103 B-107 to B-113 B-117 to B-121 Total Samples	17	B-1A and B-2A	2
TH-3	Total Samples		B-146-1 to B-147-1 B-148 to B-149	4
TH-4	B-114 to B-116 B-122 to B-124 Total Samples	6		
TH-5	B-96 to B-98 B-104 to B-106 Total Samples	6	B-2A	1
TH-7	B-37 B-41 to B-45 B-49 B-59 to B-69 Total Samples	9		
TH-10	B-66 to B-67 B-70 to B-72 B-76 B-78 to B-79 B-83 to B-84 B-87 Total Samples	11	B-73 to B-75 B-81	4
TH-12	B-88 to B-91 Total Samples	4		
TH-14	B-92 to B-95 Total Samples	4		
TH-15	B-68 to B-69 B-77, B-80 & B-82 B-85 to B-86 Total Samples	7		
	TOTALS	111		14
	TOTAL DRILL SAMPLES		125	

TABLE II: SUMMARY - SURFACE SAMPLES
Bradshaw Area

Sample No.	Type Sample*	Rock Type & Remarks
Union Assay		
B-38	Channel	Clay: 15' cut near TH-7
B-39	"	Clay: 16' cut near TH-7
B-40	"	Clay: 15.5' cut near TH-7
B-62	Chip	Breccia: Area of app. 25' dia.
B-63	Grab	Breccia: Area between B-62 and B-64
B-64	Chip	Breccia: Area of app. 25' dia.
B-146	Chip	Silic. Ls:
B-147	Grab	Silic. Ls. and Ter. Volcanics: Prospect Dump
	Total Samples	8
Pioche Assay		
B-125	Chip	Silic. Sed: Area of app. 20' dia.
B-126	Chip	Silic. Sed: Area of app. 25' dia.
B-127	Chip	Silic. Sed: Area of app. 25' dia.
B-128	Chip	Silic. Sed: Area of app. 25' dia.
B-129	Chip	Silic. Sed: Area of app. 25' dia.
B-130	Chip	Silic. Sed: Area 10 x 30'
B-131	Chip	Silic. Sed: Area of app. 20' dia.
B-132	Chip	Breccia: Area of app. 20' dia.
B-133	Chip	Breccia: Area of app. 20' dia.
B-134	Chip	Breccia: Area of app. 15' dia.
B-135	Chip	Breccia: Area of app. 15' dia.
B-136	Grab	Breccia: Area between B-135 and road to the east
B-137	Chip	Breccia: Area of app. 20' dia.
B-138	Chip	Breccia: Area of app. 20' dia.
B-139	Chip	Breccia: Area of app. 20' dia.
B-140	Chip	Silic. Sed: Area of app. 25' dia.
B-141	Grab	Limestone: Red, prospect dump
B-142	Chip	Silic. Ls.: Area 10 x 30'
B-143	Chip	Silic. Ls.: Area of app. 20' dia.
B-144	Chip	Silic. Ls.: Area of app. 15' cia.
B-145	Chip	Silic. Ls.: Area of app. 15' dia.
	Total Samples	21
	TOTAL SURFACE SAMPLES	29

* The three channel samples were taken in a nearly north-south, horizontal cut in the high bank east of TH-7. Grab samples represent 10-20 small fragments or small handfuls, depending upon the material, from the sample area. Chip samples of either silicified breccia or silicified sediments including limestone, shale and dolomite are made up of numerous fragments one cubic inch or less from an area ranging from about 10 to 25' in diameter.

TABLE III: ASSAY SUMMARY

Union Assay Samples

Drill Holes

B-1	to B-37	(37)	
B-41	to B-50	(10)	
B-54	to B-61	(8)	
B-65	to B-72	(8)	
B-76	to B-80	(5)	
B-82	to B-124	(43)	
	Total Samples		111

Surface

B-38	to B-40	(3)	
B-62	to B-64	(3)	
B-146	to B-147	(2)	
	Total Samples		8

Total Union Assay Samples 119

Pioche Assay Office Samples

Drill Holes

B-51	to B-53	(3)	
B-73	to B-75	(3)	
B-81		(1)	
B-1A & B-2A	(TH-2)	(2)	
B-2A	(TH-5)	(1)	
B-146-1	to B-147-1	(2)	
B-148	to B-149	(2)	
	Total Samples		14

Surface

B-125	to B-145	(21)	
	Total Samples		21

Total Pioche Assay Office Samples 35

TOTAL DRILL HOLE SAMPLES	125
TOTAL SURFACE SAMPLES	29
GRAND TOTAL - ALL SAMPLES	154

rocks having a high silica content, either in silicified sediments (limestone, dolomite or limy shale) or silicified breccias. The mineralization encountered is not ore grade but indications are that it is ubiquitous and that a commercial ore body may occur somewhere in the district. Grade of the gold usually runs around 0.005 oz. per ton, the range being from trace amounts up to a maximum of about 0.03.

In the 10 holes drilled, TH-1 contained the most extensive mineralization. It was found in the silicified unit starting at a depth of about 60 feet and continued to 470 feet. It is felt that the gold-silver values are directly proportional to the silica content because TH-1 contains both the largest silicified zone and the most extensive mineralized sequence.

Noted also in hole 1 were minute amounts of copper, lead and zinc, mostly in the interval 205-240 feet. This is the only hole in which these elements or minerals bearing these elements were observed.

Holes drilled strictly within the dolomite or limestone-shale units, e.g. TH-3, 7 & 14, showed practically no detectable amounts of gold or silver.

Also it was found that the jasperized breccia, on the east side of the range and upon which TH-10 was located, apparently carries less values than the other silicified units. This was born out both by the drilling and the surface sampling.

Samples collected from the numerous surface exposures of silicified material were taken for the purpose of trying to detect zones with higher gold-silver values and thus assist in the selection of the drill sites. Returns, however, failed to show any anomalous values that would indicate favorable target areas.

GEOLOGY

General Statement

Rocks exposed in the subject area consist principally of Ordivician limestone, shales and dolomites that have a prevailing, moderate northeast dip, that are overlain by varying types of Tertiary volcanics and that have been locally faulted, folded and silicified or intruded by silicified breccias. According to the Atomic Energy Commission's terminology (Sharp and Myerson, 1956) the oldest unit has been designated the Tank Hill Limestone, overlain with conformable sequence by the Eureka Quartzite and Ely Springs Dolomite.

The largest percentage of drilling was done in silicified zones within the Tank Hill Limestone which in the unaltered areas is comprised of many interbedded units of limestone and shale.

Most of the breccias appear to be located on or adjacent to major faults or fault intersections. The same is possibly true of the silicified sediments but there the faults are not as easily recognized. The true breccias are somewhat elliptical or pipe-like in shape although a number of them resemble dikes. They consist of silicified limestone and dolomite fragments held in a matrix of hard massive silica. Near exposures of Eureka Quartzite or where there is apparently only a thin covering of Ely Spring Dolomite (TH-12 area), the breccias contain quartzite fragments and thus indicate its intrusive nature into the younger units.

Structure

Faults in the mapped area occur in three main systems, a generally east-west trend and northwest and northeast lineations. Many

of the faults extend southward and are expressed in the recent volcanics. Indications are that the more intense silicification is found near intersections formed between east-west faults and those trending northwest.

Mineralization

Early in the examination an attempt was made to find some megascopic criteria for determining areas with high gold-silver values. With the limited amount of work that was done both on the area investigated and around the Atlanta Mine, the following conclusions have been drawn:

1. Gold-silver values are restricted almost completely to the silicified units and that the greater the intensity of silicification the higher the values. Thus the harder the rock the greater the gold values.

2. Of the two major types of silicification, i.e. silicified dolomites and limestones and/or shales and silicified breccia pipes and dikes, the latter has the higher percentage of gold. This is particularly true of the breccias having a light bluish-gray hue, being extremely hard, and showing little or no pyrite. Samples with high pyrite, estimated at around 1%, were not of ore grade. However the pyrite apparently is associated with the auriferous mineralization and induced polarization may be used to delineate hidden silicified bodies containing localized values in gold.

3. The jasperized breccias which occur mostly along the east flanks of the range are less gold bearing than the others.

4. Brecciated units of Ely Springs Dolomite were found to be barren of any important mineralization. This can also be said of the Tertiary volcanics with the exception of areas adjacent to mineralized faults and joints.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

The area examined under this program contains relatively large bodies of intense silification which carries small quantities of gold-silver

mineralization. These values were noted in both silicified sediments and in elliptical shaped breccias. Gold content usually amounted to about 0.005 ounces per ton and occurred in slightly higher values within the silicified breccias. Neither the drill hole assays nor those from the surface gave indication of mineralization that could be considered by processing with the Atlanta reserves.

Additional targets in the southern portion of the Atlanta District may eventually produce ore-grade reserves but these would be below depths amenable to open pit processing.

Recommendations

Because of the unfavorable results from the investigation and in being unable to locate additional gold-silver reserves for the Atlanta mill, it was recommended that the drilling as outlined be terminated short of the planned 5000 feet.

It is further recommended that any further search for supplemental reserves be concentrated in and around the Atlanta Mine where apparently there is a greater intensity of auriferous mineralization.

Respectfully Submitted:

Ted L. Hanks

Date: December 1, 1967

Ted L. Hanks

BIBLIOGRAPHY

Numerous private reports collected and now in the files of A & B Gold-Silver Mines, Inc.

Sharp, B. J. & Myerson, B. L., 1956, Preliminary Report on a Uranium Occurrence in the Atlanta Area, Lincoln County, Nevada: U. S. Atomic Energy Comm. No. RME-2048 (Rev.), 17 p.

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10'

DIRECTION Vertical
INCLINATION -
STARTED 8-30-67
COMPLETED 9-27-67
DEPTH 503.0'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO. TH-1
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N 100682 E 51514
COLLAR ELEV. 6938.6'
SHEET 1 OF 7
HOLE SIZE NQWL 8-247, BXWL 247-503'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (ft)	ASSAYS Au	Ag	Pb	Cu	Zn
5	8	Rock Bit (4½"): No Sample Hole collared in silicified Ls. which weathers light to dark-brown.	8.0	-						
10 15 20	20.8	Limestone: Lt gray, fine-grained; Considerable fractures. Inclusions of pink, dense Ls.	12.6	100	B-1 6.0	Tr	0	0	0	0
25	28.2	Limestone & Clay Gouge: Fault Zone (?). Brown to deep red iron oxide. Small calcite stringers.	7.6	70	B-2	.005	0	0	.025	0
30 35 40 45 50	54	Limestone: Light-gray, fine-grained with numerous thin, tan, shaley Ls. inclusions which give the unit a mottled tan-gray coloration No important mineralization.	3.8 5.0 5.0 6.0 4.0	100 100 100 100 100	B-3	0	0	0	0	0
55 60	62	Limestone: Badly broken (fault?). Silicified, moderate iron oxide and some manganese; pyrite near bottom. Pyrite (+)	5.0 5.0	82 76	B-4 8.0	Tr	0	0	0	Tr
65 70 75		Silicified Breccia: Light-gray & pink to reddish-brown; vuggy, traces of pyrite some of which has altered to hematite. Considerable jasper.	5.0 3.0 4.0 4.5 ~~0.5~~	86 80 100 100 ~~100~~	B-5 12.0 B-6 8.0	Tr Tr	0 0	Tr 0.25	.006 .006	0 0

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-1
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 7
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (ft)	ASSAYS Au	Ag	Pb	Cu	Zn
		Silicified Breccia: Gray with occasional vuggy zones. Predominantly yellowish-brown and red jasper inclusions. Only traces of pyrite (hematite) below 90'.	3.5	93						
85			5.0	70	B-7 9.5	.005	0.1	0	0	Tr
90			4.5	87						
			~~1.0~~	~~100~~						
95			5.0	100	B-8 9.5	.005	0	0	0	0
100			3.5	100						
105		Silica-lined water coarses and cavities.	6.0	90	B-9 13.0	.005	0	0	0	0
110			7.0	71						
115			5.0	95						
120			2.0	100						
125			5.0	100	B-10	Tr	0	0	.006	0
130			5.0	100						
			3.0	100						
135			6.0	100						
	135									
140	140	Gouge & Silic. Brecc.:			B-11	Tr	0.2	0	0	0
		Silicified Breccia: Same as above.	5.0	100						
145	146									
150		Silicified Breccia: Fragments & intervals with considerable clay; traces of calcite.	4.0	93						
			3.0	100	B-12 11.0	.005	0.2	Tr	.006	0
155		Silic. fragments are leached & have a pronounced vuggy texture.	5.0	67						
			4.0	73						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-1
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 7
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	Ag	Pb	Cu	Zn
165		Breccia: Considerable clay, badly broken; vuggy texture. Light to dark gray with variable amounts of iron oxide. (Unit is possibly a silicified and kaolinized Ls.	5.0	90	B-13	.005	0.2	0	0	0
170			4.0	70	B-14	.005	0	0	0	0
			3.0	33	B-15	Tr	0	0	0	0
175			4.0	50	B-16	Tr	0.2	0	0	0
180			5.0	46	B-17 10.0	.005	0	0	0	0
185			5.0	36						
190			5.0	38	B-18 10.0	.005	0.2	0	.006	Tr
195		Strong iron oxide 198-201'.	5.0	26						
200		Scattered throughout are fine, black or red specs that appear to have been pyrite. Rock in general is vuggy & has been leached.	4.0	100	B-19 8.0	Tr	0	0	0	Tr
			4.0	73						
205			5.0	8	B-20 12.0	.01	0.4	.5	.012	0
210		Circulation losses beginning at about 170' and increasing to 247'. Cemented five times in this interval and each time lost circulation when cement was drilled out.	5.0	6						
215			2.0	15						
220			5.0	18	B-21 9.0	Tr	0	0	0	Tr
225			4.0	25						
			3.0	13	B-22 6.0	.005	0.2	0	0	Tr
230			3.0	37						
235		Limestone: Only 0.6' recovered; med-grained; partially pyritized.	15.0	5	B-23	.005	0.3	0	.006	0.2

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-1
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 7
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (m)	Recovery (%)	Sample (No.)	ASSAYS				
245		At 247' hole cased & reduced from NQWL to BxWL.								
250	247	Limestone: Light-gray, fractured with intensive silicification; some jasper. Silicified zones are pink & in some cases deep red from iron oxide. Numerous vugs; some Mn oxide.	5.0	70						
255			9.0	100						
260										
265			5.0	100	B-24	Tr	0			
270		Hard drilling; averaging less than 10' per bit. Only occasional circulation return.	7.0	86	B-25 10.0	.005	0			
275			3.0	100						
280			9.5	100	B-26 9.5	.005	0.1			
285										
290			10.0	100	B-27 8.5	.005	0.1			
295	294	Limestone: Brecciated and much less silicified. Wollastonite.								
300	298	Silicified Breccia: Quartz is mottled white & brick-red (iron oxide). Minute specs of pyrite noted at 300 & 306'.	5.5	100						
305			5.0	78	B-28 7.9	Tr	0			
			1.6	100						
310			2.4	100	B-29 9.0	Tr	0.1			
			3.0	67						
315	315	Limestone: White, fine-grained & brecciated. Considerable wollastonite.	5.0	56						
			3.0	100						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-1
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 5 OF 7
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (%)	ASSAYS Au	ASSAYS Ag
	321.6		1.0	100			
325		Limestone: Brecciated & highly silicified. Mottled pink & white; some red iron oxide veins. Part of red coloration due to small flakes of specularite.	7.0	44	B-30 10.9	Tr	0
330			7.0	100			
335							
340		Less silica near bottom.	6.0	42			
	341.5						
345		Silica: Highly silicified Ls., badly broken, vuggy & caving. Calcite lined vugs.	4.0	10	B-31 9.5	Tr	0.2
350			5.0	28			
			2.0	25			
355		No circulation and poor recovery due to broken ground.	4.0	13	B-32 9.0	.005	0.1
360		Cemented at 353 & 362'. Hard drilling.	3.0	13			
			2.0	100			
			2.0	60			
365			2.0	100			
370			9.0	100	B-33	.005	0.1
375							
	377.9						
380	380	Quartz Vein: White, small veins of pyrite	6.5	98			
		Silica: Silicified Ls. Same as above.	3.5	100			
385			5.0	100	B-34 6.0	.005	0.1
390		Pyrite (+) somewhat massive, minute crystals.	6.0	100	B-35 4.0	Tr	0.1
395					B-36 2.0	.005	0.3
			2.0	40	B-46 5.0	.005	0.1
			3.0	50			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-1
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 6 OF 7
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	Ag	Pb		
405	405	Silica: Massive silicification of Ls. ? 0.2' galena at 404'. Pyrite, some S.	1.5	100	B-47 4.3	.005	0.1	0		
			3.5	83						
410		Silica: Pyritized, dark reddish-brown iron oxide; vuggy. Bits averaging about 7'. Hole caving, cemented at 415.6'.	5.0	100	B-48 5.7	.005	0.1			
					B-52	.03	.07	Tr		
415			4.6	100	B-50 8.0	Tr	0.1			
			3.4	100						
420	420		1.0	100						
425		Silicified Breccia: Mottled red, white; Pronounced breccia fragments. Intensive pyrite mineralization.	5.0	100	B-54 2.6	.005	0.3			
					B-51	.01	.01			
			2.0	100	B-55 5.4	.005	0			
430		Badly broken 430-436' and caving.	5.0	100	B-53	Tr	Tr			
435			4.0	93	B-56 6.0	Tr	0.2			
440		Zones of nearly complete silicification.	5.0	72	B-57 6.0	.005	0			
445			8.0	71	B-58 7.0	Tr	0			
450		Below 450' are extensive vugs & quartz-lined water coarses.	1.5	100						
			2.5	84	B-61 10.0	.005	0.2			
			1.0	60						
455			4.0	88						
460			2.0	100						
			2.0	100						
			2.0	100						
465			6.0	100						
470	470	Limestone: Brecciated, light-brown or greenish-brown; veins of calcite & some quartz. Minor oxide staining. No sulfides; partially kaolinized.	3.0	50	B-65 13.0	Tr	0			
475			5.0	82						
			5.0	100						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-1
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 7 OF 7
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS
		Limestone: Brecciated (Cont.)				
485			5.0	100		
490		Occasional zones carrying specs of hematite after pyrite.	4.0	100		
495			5.0	100		
			2.0	100		
500			4.0	100		
505	503 T.D.					

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10'

DIRECTION Vertical
INCLINATION –
STARTED 10-19-67
COMPLETED 11-7-67
DEPTH 266'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO TH-2
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N 99,845 E. 52,650
COLLAR ELEV. 6995'
SHEET 1 OF 4
HOLE SIZE NXL 4-7, NQWL 7-112 & BQWL 112-266'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Specs (lbs)	ASSAYS Au	ASSAYS Ag
		Rock Bit (4½"): No sample. Hole collared on silicified limestone outcrop.	4.0	–			
4.0							
5		Massive Silicification: Silicification of a limestone (?) unit. Light gray to light tan, vuggy and extremely hard.	3.0	100			
10			4.0	80	B-99 6.0	Tr	0
			2.0	80			
15			2.0	100			
		Pyrite (%), where shown, is found in the bluish-gray silica. It is coarser grained than that in TH-1 and occurs as fairly distinct crystals.	2.0	70	B-100 7.0	Tr	0.1
			1.0	100			
20			2.0	55			
			2.0	100	(B-1A	Tr	Tr @ 21')
25			5.0	26	B-101 7.0	Tr	0
30			5.0	62	(B-2A	.01	.04 @ 30')
					B-102 10.0	.01	0.2
35			5.0	14			
40			5.0	12	B-103 10.0	0	0.1
45			5.0	4			
47		Limestone: White, fine- to medium-grained. Fractured and partially recrystallized. Silicification in upper portion.					
50			10.0	18			
55							
60			6.3	56			
65			4.0	73			
70		Clay streaks at bottom.	5.0	26			
71							
72		~~Clay: Lt. tan & brown; Ls. fragments.~~					
75		Silicified Sediments: White, Gray and light red and brown, buggy & fractured and caving. Some pyrite (%).	5.0	18	B-107 9.0	Tr	0
			2.0	25			

SCALE		DIRECTION	
		INCLINATION	
		STARTED	
		COMPLETED	
		DEPTH	
		LOGGED BY	
		DRILLER	

HOLE NO TH-2
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag			
			2.0	40						
		Silicified Sediments (Cont.): In part brecciated.	2.0	25						
85			4.0	10	B-108 11.0	.005	0.1			
90			5.0	12						
95		Entire unit is extremely vuggy with zones of open ground where drill tools dropped from 3-6'.	5.0	6	B-109 11.0	Tr	0			
100			6.0	17						
105			5.0	12						
110		Cased and reduced at 112'.	4.0	45	B-110 13.0	Tr	0			
115		Pyrite is in part altered to hematite.	4.0	18						
120			5.0	6	B-111 10.0	.025	0			
125			5.0	6						
130			10.0	1	B-112	.005	0			
135										
140			8.0	1						
145	145	Limestone: Contact somewhere below 144'. White, Medium-grained, partially silicified.	3.0	23						
			1.0	100						
150			4.0	15						
	152	Massive Silicification: Pyritized. White and red.	3.0	17	B-113	.005	0			
155	155	Limestone; Same as above unit.	2.0	60	B-117 7.0	Tr	0			
			3.0	50						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-2
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
		Silicified Limestone: White to lt. gray with silica zones being a pinkish-gray and vuggy. Hole caving. Small amounts of black, coarse calcite.	2.0	80			
165			4.0	40	B-118 10.0	Tr	0
170	168	Limestone: White with dark gray calcite at top and bottom of interval. Medium-grained. No mineralization.	6.0	87			
175			5.0	100			
180			4.0	100			
185			4.0	88			
190			5.0	72			
	191	Silicified Limestone: Ls. is light to dark gray and pink; minor pyrite-hematite ( ); vuggy and partially brecciated.	2.0	85			
195			5.0	100	B-119 8.0	.005	0.2
			3.0	57			
200			3.0	43			
205			2.0	100	B-120 10.0	.005	0
			5.0	100			
210			2.5	12			
215			1.5	100	B-121 8.0	Tr	0
			1.0	100			
			3.0	100			
220	220	Limestone: White to gray, medium-grained. An occasional thin zone of silica. Wollastonite at 226'.	4.0	100			
225			4.0	100			
230		Traces of pyrite at depths shown.	5.0	100			
235			10.0	100			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-2
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
		Limestone (Cont):	2.0	100			
245		some the coarser limestone has a light pink cast.	5.0	100			
250			5.0	100			
255		No important mineralization.	6.0	100			
260			5.0	100			
265	266 T.D.		2.0	100			
270							

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10'

DIRECTION Vertical
INCLINATION -
STARTED 11-8-67
COMPLETED 11-10-67
DEPTH 145'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO TH-3
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N.101060 E.53,735
COLLAR ELEV. 6980'
SHEET 1 OF 2
HOLE SIZE NQWL 6-145'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
5	6	Rock Bit (4½"): No sample. Hole collared on silic. Ls.-Ls. contact.	6.0	-	-		
10	12	Limestone: Gray, numerous tan, shale partings.	7.0	100			
15		Silicified Limestone: Reddish-gray, nearly complete silicification except for tan shale partings. Vuggy. Calcite veins and lined vugs.	10.0	100	B-146 6.0	Tr	Tr
20					B-147 4.0	Tr	Tr
25	25	Shale & Limestone: Gray and yellowish-brown; partially brecciated & silicified.	10.0	100			
30	32.5						
35		Brecciated Shale: Some limestone. Gray, yellow and red. (Compact gouge ?).	5.0	100	B-148 5.0	Tr	Tr
40	39	Limestone & Shale: Limestone is gray with much shale and / or clay. Shale is tan and deep red. Unit is fairly well broken up and soft.	6.0	100			
45			6.0	100			
50		No mineralization.					
55			7.0	60			
60		Dark brick red shale and clay from 57-74'.	10.0	97	B-149	Tr	Tr
65							
70			4.0	25			
			2.0	50			
			2.0	100			
75			6.0	100			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-3
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 2
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
		Limestone & Shale (Cont.):					
85			4.0	100			
	87	Base of major oxidization.	5.0	100			
90		Limestone & Shale: Ls. is gray and fine grained, shaley. Shale is Dark-gray to almost black, carbonaceous.	7.0	100			
95							
100			9.0	100			
105		No mineralization.					
110		From approximately 98' to T. D. the rock is predominantly tan or gray shale having irregular lenses or thin beds of fine-grained, gray limestone.	10.0	100			
115							
120			8.0	100			
125							
130			10.0	100			
135			3.0	100			
140			8.0	100			
145	145 T.D.						
150							

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10'

DIRECTION Vertical
INCLINATION –
STARTED 11-1-67
COMPLETED 11-7-67
DEPTH 167'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO TH-4
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N 100,520 E. 52,415
COLLAR ELEV. 7106'
SHEET 1 OF 3
HOLE SIZE NQWL 11-100' BQWL 100-167'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
5, 10		Rock Bit (4½"): No sample. Hole collared on outcrop of silicified limestone.	11.0	–			
11–14		Silicified Limestone: Mottled gy & red.	1.0	100			
			1.0	40			
15		Limestone: Varying degrees of silicification. Light gray, reddish-gray with numerous light-green shale beds or partings ¼-½" wide. Considerable fracturing and re-cementing with silica or calcite.	5.0	20	B-114 10.0	Tr	0
20			3.0	23			
25			4.0	75			
30		Silica zones (△) are reddish and in places carry minor pyrite (⁂).	8.0	94			
35			4.0	85	B-115 5.0	Tr	0.1
			1.0	100			
40			9.0	100			
45		Silicified zones are vuggy having many of the openings lined with crystalline quartz.					
50			4.5	100			
			1.5	100			
55			4.0	100	B-116 5.5	Tr	0.1
60, 65			10.0	100			
70			9.0	100			
75			2.5	100			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO. TH-4
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
85		Limestone (Cont.): More silicious near bottom.	8.5	66			
90			5.0	100	B-122 10.0	Tr	0
95	96		5.0	100			
100		Limestone: Light gray & tan, slightly shaley and in places brecciated.	3.0	100			
			5.0	100			
105			5.0	92			
110			1.0	100			
115		Dark gray to black shaley limestone, 112-115'.	5.0	100	B-123	Tr	0
120			5.0	100			
125			5.0	100	B-124 10.5	Tr	0
130			5.5	100			
135		No mineralization.	4.5	100			
140			5.0	100			
145			5.0	100			
150			5.0	100			
155			5.0	100			
			1.0	100			
			5.0	100			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO. TH-4
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lb)	ASSAYS Au	ASSAYS Ag			
85		Limestone (Cont.): More silicious near bottom.	8.5	66						
90			5.0	100	B-122 10.0	Tr	0			
95	96		5.0	100						
100		Limestone: Light gray & tan, slightly shaley and in places brecciated.	3.0	100						
105			5.0	100						
110			5.0	92						
			1.0	100						
115		Dark gray to black shaley limestone, 112-115'.	5.0	100	B-123	Tr	0			
120			5.0	100						
125			5.0	100	B-124 10.5	Tr	0			
130			5.5	100						
135		No mineralization.	4.5	100						
140			5.0	100						
145			5.0	100						
150			5.0	100						
155			5.0	100						
			1.0	100						
			5.0	100						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-4
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lb.)	ASSAYS Au	ASSAYS Ag
165			5.0	100	-		
	167 T.D.						
170							

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10'

DIRECTION Vertical
INCLINATION -
STARTED 10-19-67
COMPLETED 10-31-67
DEPTH 151'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO TH-5
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N101,715 E. 55,248
COLLAR ELEV. 7324.8
SHEET 1 OF 2
HOLE SIZE NQWL 10-77' BQWL 77-151'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag			
5		Rock Bit (4½"): No sample. Hole collared in breccia dike at mouth of Bradshaw Mine.	10.0	-						
10	10	Silicified Sediments: Slightly brecc. Generally a light-gray or mottled light- and dark-gray with small zones of either yellowish-brown or red iron oxide. Silic. zone is partly laminated and appears to represent a silic. limestone or dolomite.	1.5	100	B-96 5.0	Tr	0			
			2.5	72						
15			1.0	100						
			5.0	10						
20			2.0	85						
			1.0	0						
			2.0	100						
25			3.5	64	B-97 7.0	Tr	0			
30		No sulfides; no important mineralization.	3.5	17						
35			4.0	38	(B-2A	Tr	Tr	@ 32')		
			3.0	34						
40			1.0	80						
			1.5	53						
45		Note: From 10-46' rock is badly broken and caving; moderately hard.	4.5	37	B-98 10.5	Tr	0			
			2.0	0						
50			4.0	48						
			2.0	70						
55			2.0	65						
			4.0	40						
60		Iron oxide streaks of yellowish-brown and red carrying minor pyrite & jarosite.	4.0	60						
65			2.0	15						
70		Cased and reduced at 77'. Drillers able to get in only 66' of casing because of cave.	5.0	14	B-104 16.0	0	0			
	73	Clay: Beginning between 71-77'. Multi-colored (red, brown & gray), some silic. breccia	6.0	7						
75		(Contact zone between silic. & sed.)	3.0	10						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-5
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 2
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
85		Mostly clay and shale with some limestone and dolomite; slightly silicified. Badly broken and hole caving from the surface to about 60'.	7.0	13			
90			4.0	5	B-105 20.0	Tr	0
			3.0	10			
95			3.0	50			
			3.0	14			
100			4.0	39			
105			1.0	30			
			5.0	10			
110			1.0	60			
115		From 116-151' poor recovery because of the broken nature of the rock and the caving. Hole repeatedly cemented.	5.0	16	B-106 10.0	Tr	0.1
120			5.0	20			
125		Rock recovered is dolomite and shale and a few fragments of limestone and silica.	5.0	0			
130			5.0	0			
135			5.0	4			
140			5.0	6			
145			5.0	8			
150	151 T.D.		5.0	0			
155							

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10'

DIRECTION Vertical
INCLINATION -
STARTED 9-18-67
COMPLETED 9-27-67
DEPTH 281.0'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO TH-7
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N. 103988 E. 53382
COLLAR ELEV. 7420.5
SHEET 1 OF 4
HOLE SIZE NQWL 60-281'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag			
5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55		Rock Bit ($4\frac{1}{8}$"); 0-60' sludge samples only. Hole collared in limestone near, about 12', from the faulted limestome-quartzite contact. Much kaolinization with the limestones. Note: Hole located adjacent to the fault contact between the Ely Springs Dolomite and the Eureka Quartzite. Heavy red coloration due to the iron oxide within the clay.			-					
60	60	Clay & Minor Limestone: Clay is brick-red with inclusions and thin zones of gray limestone; partial recrystallization of the limestone.	4.5	100						
65			5.5	100	B-37	Tr	0			
70			5.0	94						
75			4.0	100						
			1.0	100						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-7
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag			
	80.5									
85		Limestone: Gray with zones of Red clay either as fine streaks or zones up to 0.5' thick. Ls. is somewhat fractured but bedding is apparently dipping 40-45°.	5.0	100						
90			5.0	100						
95			5.0	100						
100			5.0	100						
	102	Clay: Deep red; minor ls. fragments.	5.0	100	B-41 3.0	0	0			
105	105	Limestone & Clay: Clay is mainly deep red with some gray or yellowish-brown zones. Ls. is fine-grained with numerous clay partings.	4.0	58						
110			5.2	100						
	113	Limestone: Predominantly a fine-grained light-gray with abundant deep red or yellowish-brown shale zones or partings.								
115			5.4	100						
120			5.2	100						
125			5.2	87	B-42 7.2	0	0.1			
130			2.0	100						
135			5.0	96						
			3.0	100						
140			5.0	96						
145			4.0	100						
150	150	Limestone & Clay: Same as between 105-113'.	5.0	100						
155			6.0	95	B-43	Tr	0			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-7
PROPERTY
LOCATION
COLLAR. COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
	162		2.0	100			
165		Limestone: Some red and brown clays; Ls. is partially recrystallized.	5.0	100			
170			5.0	62			
	172	Clay & Limestone: Lithology is much the same as the units above.	4.0	100			
175							
180			4.0	100			
185			5.0	100			
190			5.0	100	B-44	Tr	0
	190.5	Limestone: Light-gray, few brown shale partings; Fine-grained; minor recrystallization.	5.0	100			
195	196	Clay & Limestone: Clays are deep red or yellow. Ls. is badly broken due to numerous shale partings.	5.0	100			
200			2.0	100			
			3.0	100			
205			5.0	100			
210			2.0	100			
			3.0	100			
215			5.0	100	B-45	Tr	0.1
220			5.0	100			
225	224.6	Clay: Deep red; gouge of clay & Ls. fragments. Near bottom clay is yellowish-brown.	5.0	100	B-49	Tr	0
230			5.0	100			
235	234.7	Clay & Limestone:	5.0	100			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-7
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Specs (lb.)	ASSAYS Au	ASSAYS Ag
	241						
245		Clay: Yellowish-brown.	5.0	100	-		
			4.0	100			
250	249.6		1.0	100			
		Clay & Limestone: Ls. is gray, fine-grained with numerous sh. partings.	5.0	100			
255	254				B-59 10.0	Tr	0.1
		Limestone: Numerous red, brown & yellowish-brown clay partings.	5.0	100			
260							
			3.0	100			
265		Note: No sulfides or important mineralization in the entire cored interval.	5.0	100			
270							
			5.0	100			
275			4.0	85			
			2.0	100	B-60 4.0	Tr	0
280			1.0	100			
	281 T.D.		1.0	100			
285							

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10'

DIRECTION Vertical
INCLINATION -
STARTED 9-29-67
COMPLETED 10-10-67
DEPTH 342'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO TH-10
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N 103400 E 55400 (App.)
COLLAR ELEV. 7395' (App.)
SHEET 1 OF 5
HOLE SIZE NQWL 12-272, BQWL 272-342'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lb)	ASSAYS Au	ASSAYS Ag			
5, 10		Rock Bit (4⅝"): No sample. Hole collared near contact between silicified brecc. pipe and Ely Springs Dolomite.	12.0	-	-					
12		Brecciated Dolomite (Dol.): Ely Springs Dolomite. Gray to brick-red, well cemented except for minor fractured zones. Small veins calcite, very little silica.								
15			5.0	100						
20			5.0	68						
25		Calcium cementation.	5.0	100						
30			6.0	100	B-66 9.0	0	0.1			
35			3.0	100						
40			5.0	100						
			1.0	100						
45			3.0	100						
50		Disseminated hematite (?) after pyrite. The crystals are small and some of them still retain a portion of the pyrite crystal form.	7.0	100						
55		Hematite-pyrite (+++)	10.0	100						
60										
65			6.0	100						
70			4.0	100						
75			7.0	100	B-67 10.0	0	0			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-10
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 5
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lbs)	ASSAYS Au	ASSAYS Ag
85		Brecciated Dolomite (Cont.):	3.0	100	-		
			5.0	100			
	87	Silicified Breccia Pipe: Generally reddish-brown and vuggy. Many vugs filled with white clay. Brecc. fragments made up mostly of white angular quartzite. Matrix consists of silica, calcite and some clay.			B-73	Tr	Tr
90			5.0	78			
95			5.0	100	B-70 7.0	0	0
100		Upper portion contains considerable clay and specs of hematite (pyrite).	5.0	90			
					B-74	0.1	.09
105			5.0	100	B-71 7.0	0	0
			2.0	100			
110			5.0	100	B-72 6.0	0	0
115		116-125' considerably harder, inclusions of black silica (flint).	1.5	100			
			0.5	100			
			2.0	100			
120			3.5	100	B-76 8.0	0	0.1
			1.5	100			
			1.0	100	B-75	.03	.22
125			1.0	100			
			3.6	94			
130			1.4	100			
	131	Brecciated Dolomite: Mottled gray, and reddish-brown; calcite lined fractures. Silicious at top.	5.0	92			
135			4.0	78			
140		140-143' dark-brown and sandy textured.	4.0	100	B-78	Tr	0
145			4.0	100			
150			5.0	100			
			3.0	100			
155			5.0	100			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-10
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 5
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag			
165		Brecciated Dolomite: Silicified near bottom, generally light reddish-brown matrix with light bluish-gray dol. fragments. Dol. fragments are 1" in diameter or less.	5.0	100	B-79 9.0	0	0			
			4.0	100						
170		Fractures filled with deep, red-brown hematite. No sulfides.	5.0	100						
175			5.0	100						
180			5.0	100						
185	186		5.0	76						
190		Silicified Breccia: Mottled red, brown, yellowish-brown and white; vuggy at top and in scattered zones toward bottom, most of vugs are filled with secondary white clay.	6.0	100	B-83 11.0	0	0.1			
195										
200		Numerous inclusions (1" and smaller) of quartzite. Vuggy nature indicates extensive leaching. Unit may in part be volcanic.	6.0	100						
			1.0	100						
205			5.0	100						
210			5.0	60						
215			5.0	60						
			2.0	60						
220			1.0	100						
			2.0	100						
	223		3.0	100						
225		Breccia: Strongly silicified, some vugs, moderate amounts of iron oxide coloration, minor hematite	3.0	100	B-84 5.5	0	0.2			
			1.0	100						
230			2.0	100	B-81	Tr	Tr			
		Badly broken and caving 231-242'	2.0	100						
235			3.0	100						
			2.0	100						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-10
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 5
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lb.)	ASSAYS Au	ASSAYS Ag
		Breccia (Cont.):	1.0	100			
245		245.5	5.0	58			
250		Interbedded Limestone & Shale: Ls. is light-gray, fine-grained and has abundant reddish-brown shale partings. Thin zones of clay and a few calcite-lined fractures. Slightly fossiliferous.	5.0	100			
255			5.0	100			
260			5.0	100			
265			5.0	100			
270			5.0	100			
275		At 272' hole cased and reduced to BQWL.	8.0	100			
280		No important mineralization.	5.0	66			
285			7.0	100			
290							
295			9.0	50	B-87 16.0	Tr	0
300							
305			7.0	51			
310			6.0	52			
315			4.0	80			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-10
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 5 OF 5
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS
		Interbedded Limestone & Shale (Cont.):	6.0	25		
325			2.5	100		
			3.5	100		
330			2.0	80		
			4.0	79		
335			1.0	100		
340		Dark red, sticky clay 341-342'.	5.0	100		
	342 T.D.					
345						

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10'

DIRECTION Vertical
INCLINATION -
STARTED 10-11-67
COMPLETED 10-18-67
DEPTH 117.5'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO TH-12
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N102,983 E. 54,430
COLLAR ELEV. 7510.3'
SHEET 1 OF 2
HOLE SIZE NQWL 8-70' NXL 70-117.5'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag			
5		Rock Bit (4½"): No sample. Hole collared in silicified breccia.	8.0	-						
8.0										
10		Silicified Breccia: Mottled white & light reddish-brown; most of the white fragments are clay. Traces of pyrite (hematite) (tt). Breccia fragments consist of clear quartz, quartzite & possibly some chert.	5.0	100	B-88 8.0	0	0.1			
15			5.0	100						
20			7.0	44						
25										
25.5		Dolomite: Brecciated, minor lime content. Deep reddish-brown and slightly vuggy. Zones of bluish-gray chert.	3.0	67	B-89 6.0	0	0.2			
30			3.0	100						
35			5.0	80						
		Ely Springs Dolomite								
40			5.0	54						
			2.5	40						
45			1.5	47						
50			6.0	50						
55			5.0	56	B-90 16.0	0	0			
60			5.0	80						
65			2.0	100						
			3.0	80						
70		Began coring at 70' with "L" series barrel.	4.0	100						
			1.5	100						
75			4.5	73						
78		Quartzite:	4.0	100						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-12
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 2
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag			
		Quartzite: Generally white with minor zones of iron oxide coloration. A uniform fine-grained texture. Contact between quartzite and overlying brecciated dolomite is a lithologic gradation; no apparent faulting. No brecciation in top of quartzite.	2.0	100						
			1.0	100						
85			5.0	100						
90			2.0	100						
			7.0	100						
95										
		Eureka Quartzite.								
100			6.0	100	B-91	0	0.1			
105		A few iron oxide stained fractures.	5.0	100						
110		Extremely hard drilling; bits averaging only about 5-8'.	4.0	100						
			1.5	100						
115			4.0	100						
	117.5 T.D.									
120										

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10 '

DIRECTION Vertical
INCLINATION –
STARTED 10-11-67
COMPLETED 10-19-67
DEPTH 202'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO TH-14
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N 103,411 E 53,850
COLLAR ELEV. 7415.3'
SHEET 1 OF 3
HOLE SIZE NQWL 8-202'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
5		Rock Bit (4½"): No sample. Hole collared in Eureka Quartzite float overlying Ely Springs Dol. (?).	8.0	–			
10		Quartzite boulders and fragments of Ls. and shale mixed with scil. Quartzite caving and being redrilled.	3.0	34			
			5.0	36			
15		Interbedded Shale or Clay & Limestone: Ls is light-gray, fine-grained with abundant shale or clay partings. The shaley units down to about 110' are mostly a brown to deep reddish-brown clay.	1.0	100			
20			4.0	65			
25			5.0	100	B-92 10.0	0	0
30		The beds are dipping at approximately 40°.	5.0	100			
35		Log is representative of lithology at depths shown.	6.0	57			
40			5.0	100			
45			5.0	100			
50			5.0	100			
55			5.0	100			
60			5.0	100			
65		Foss. limestone units.	5.0	100	B-93	0	0
70			10.0	100			
75							

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-14
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
85		Primarily deep brick-red clay; some is mottled light-gray or yellow with prevailing red. Very little limestone	11.0	100			
90			4.0	100			
95			5.0	100	B-94	0	0
100			5.0	78			
105			5.0	100			
110		Increase in limestone at 106' with clay units and partings giving way to soft, reddish-brown or gray shales.	5.0	100			
115			5.0	100			
120		Limestones below 111' are dense, light-bluish gray and slightly foss.	5.0	100			
125			5.0	100			
130			5.0	100			
135			5.0	100			
140	140		5.0	100			
145		Interbedded Limestone & Shale: Ls. is dense, light- to dark- gray & shaley. Shale is light reddish-brown to gray and occurs as irregular lenses or partings within the limestone.	5.0	100			
150			5.0	100			
155		Limestone units are highly foss.	5.0	100			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-14
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 3
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
		Interbedded Shale & Limestone: Same lithology as above.	5.0	100			
165			5.0	100			
170			5.0	100			
175			2.0	100			
180			8.0	100	B-95	0	0
		No important mineralization.					
185			5.0	100			
190			5.0	100			
195			5.0	100			
200			5.0	100			
		202 T.D.					
205							

A & B Gold-Silver Mines, Inc.
P. O. Box 418
Pioche, Nevada

SCALE 1" = 10'

DIRECTION Vertical
INCLINATION -
STARTED 9-28-67
COMPLETED 10-10-67
DEPTH 323'
LOGGED BY T. L. Hanks
DRILLER E. J. Longyear Co.

HOLE NO TH-15
PROPERTY Bradshaw
LOCATION Lincoln Co., Nevada
COLLAR COORD. N 101,763 E 55,398
COLLAR ELEV. 7326.3'
SHEET 1 OF 4
HOLE SIZE NQWL 12-323'

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (No.)	ASSAYS Au	ASSAYS Ag
5, 10	12	Rock Bit (4½"): No sample. Hole collared in dolomite adjacent to silicified breccia.	12.0	-			
			1.0	100			
15		Dolomite (Dol): Mottled red, reddish-brown with white and gray zones. Some clay, minor iron oxide.	4.0	100			
20			3.0	80			
		Ely Springs Dolomite.	4.0	100			
25			4.0	100			
30			4.0	100			
	33		3.0	100			
35		Dolomite: Yellowish-gray to reddish-brown; much clay, limited silicification.	1.0	100			
40			4.0	100			
	41						
45		Dol: Brecciated, mottled white & gray with iron stained fractures throughout. Specs of hematite, after pyrite, disseminated through interval.	5.0	100	B-68 10.0	0	0
			5.0	86			
50			5.0	100			
55			2.0	10			
	57						
60		Dol: Mottled gray, red & brown. Considerable clay; badly broken below 68'.	3.0	100			
			2.0	40			
65			5.0	100	B-69 12.0	Tr	0
70		Below 74' core is mostly clay; red brown & gray.	5.0	62			
			2.0	35			
75			1.0	50			
			1.5	38			
			3.5	88			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-15
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 2 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lb)	ASSAYS Au	ASSAYS Ag
		Abundant clay.	5.0	100			
85							
		No important mineralization	2.0	34			
			3.0	39			
90							
			2.0	80			
			3.0	53			
95							
			2.0	80			
			1.0	80			
100	100		2.0	33			
		Limestone & Clay: Light-gray Ls. with Red and brown clay partings; much of the clay appears to be washing out during the drilling.	3.0	67			
105			4.0	100			
					B-77 10.0	0	0.1
110			6.0	67			
			1.0	30			
115			1.0	60			
			1.0	30			
			2.0	65			
			1.0	100			
120		Badly broken; predominantly a soft, red and brown clay. Ls. also contains numerous clay partings.	2.0	50			
			1.5	40			
			2.0	40			
125							
			2.0	100			
			2.0	55			
130			2.0	55			
			2.5	100			
135		Possible fault zone in interval between 120-153.5'.					
140			9.5	74	B-80	Tr	0.3
			1.0	100			
145			2.5	80			
			4.0	75			
150			1.5	0			
			2.0	100			
	153.5		1.0	100			
155		Interbedded Shale & Limestone:	4.0	100			

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-15
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 3 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lb)	ASSAYS Au	ASSAYS Ag			
		Interbedded Shale & Limestone: Gray Ls., Red & brown shale. 163-167.8' is dark Maroon shale. Bedding is nearly horizontal and Ls. contains numerous shale partings.	5.0	84						
165			1.0	100	B-82 3.0	0	0			
			4.5	100						
170			2.0	100						
			4.0	100						
175			1.0	100						
			1.5	100						
			2.5	100						
180			5.5	100						
185										
		Log is representative of Ls.-shale lithology.	4.5	75						
190			5.0	100						
195		Some of shale units contain light-brown, extremely stidky clay.	5.0	100						
200			5.0	100						
205			5.0	100						
210			4.0	100						
215	211		1.0	100						
		Limestone: Light-gray with brown and reddish-brown shale partings. A few nearly vertical calcite-lined fractures.	5.0	100						
220			5.0	100	B-85 10.0	0	0			
225		No important mineralization.	5.0	100						
230			5.0	100						
235			5.0	100						

SCALE

DIRECTION
INCLINATION
STARTED
COMPLETED
DEPTH
LOGGED BY
DRILLER

HOLE NO TH-15
PROPERTY
LOCATION
COLLAR COORD. N. E.
COLLAR ELEV.
SHEET 4 OF 4
HOLE SIZE

Depth	Log	Rock Type and Description	Interval (ft)	Recovery (%)	Sample (lb)	ASSAYS Au	ASSAYS Ag
245		Limestone: Light-gray, fine to medium-grained; reddish-brown with shale partings.	5.0	100			
			3.0	100			
250			2.0	100			
			4.5	100			
255		Homogeneous unit from 214-318.5'.	5.3	100			
260							
			5.2	100			
265							
			5.0	100			
270							
			5.0	100			
275							
			5.0	100			
280							
			5.0	83			
285							
			5.0	100			
290							
			6.0	100			
295							
			4.0	100			
300			4.0	100	B-86 9.0	0	0
5			5.0	100			
			2.0	100			
		Gap of 5'. At 318.5' is brown, extremely sticky shale.	10.0	100			
			2.0	100			
	23	D.					

ATLANTA PROJECT

THE GOLDEN CYCLE CORPORATION

FEASIBILITY REPORT

ATLANTA GOLD-SILVER MINE

MARCH 1, 1970

LINCOLN COUNTY, NEVADA
T-7-N, R-68-E

John R. Haigh
Senior Geologist

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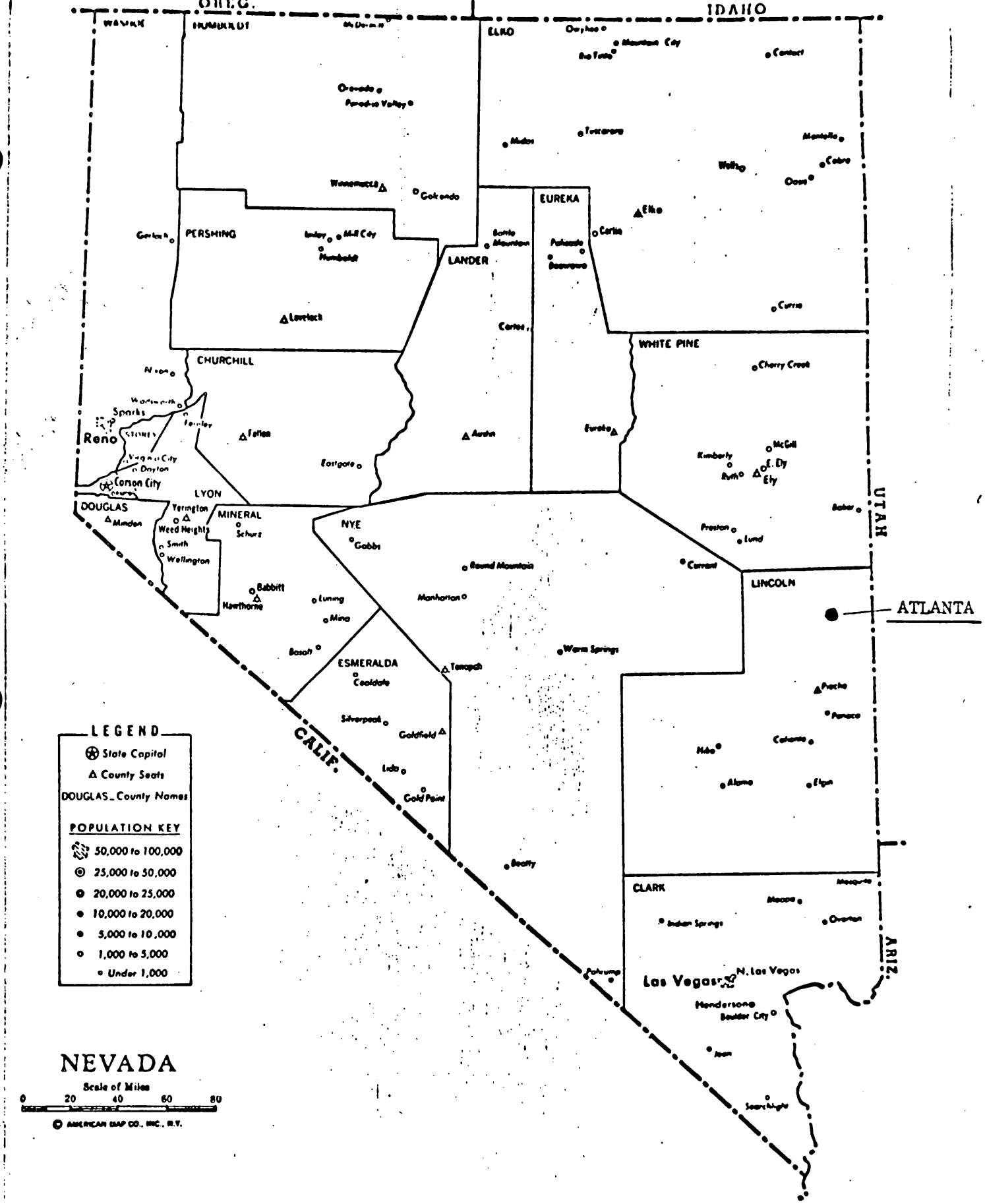
OREG.
IDAHO
UTAH
ARIZ.
CALIF.
ATLANTA
ELKO
EUREKA
LANDER
PERSHING
CHURCHILL
WHITE PINE
LYON
DOUGLAS
MINERAL
NYE
LINCOLN
ESMERALDA
CLARK
Reno
Sparks
Carson City
Las Vegas
N. Las Vegas
Elko
Ely
Tonopah
Goldfield
Beatty
Pahrump
LEGEND
State Capital
County Seats
DOUGLAS County Names
POPULATION KEY
50,000 to 100,000
25,000 to 50,000
20,000 to 25,000
10,000 to 20,000
5,000 to 10,000
1,000 to 5,000
Under 1,000
NEVADA
Scale of Miles
0 20 40 60 80
AMERICAN MAP CO., INC., N.Y.

PLATE I

SUMMARY

In May of 1969, Golden Cycle undertook a complete ore verification and feasibility study of the Atlanta Mine, Lincoln County, Nevada. The results of this study indicate 1,200,000 tons of measured ore having a gross assay value of 0.16 oz. gold and 1.66 oz. Ag per ton. This represents, at today's metal prices, over $10,000,000 of recoverable gold and silver values.

Initial laboratory tests on heap leaching feasibility indicate that the ore can be leached using normal cyanide procedures. We are favorably impressed and believe that additional work will point to a successful economic method of extracting the metal values.

LOCATION AND ACCESS

The mines and mineral deposits of the Golden Cycle Corporation in the Atlanta Mining District consist of the Atlanta, Bradshaw and Blue Bird mines, situated in parts of a single block of 190 contiguous claims, 12 of which are patented.

The 190 claims make up a block 5 miles long, 3 miles wide at the north end of the Wilson Creek Range and at the south end of Spring Valley in eastern Lincoln County, Nevada. The property is on unsurveyed land in the central part of Township 7 North, Range 68 East, Mount Diablo Base and Meridian. They include the ruins of the old Atlanta Mining Camp.

An unpaved north-south road passes through the length of the claim block and connects with U. S. Highway 93 at Pony Springs, 23 miles to the south-southwest, which is 30 miles north of Pioche, Nevada.

NAMES AND LOCATION OF CLAIMS

Golden Cycle is the owner, without liens or encumbrances, of the following unpatented mining claims in the

Atlanta Mining District, Lincoln County, Nevada:

(1) SIX (6) UNPATENTED MINING CLAIMS

Claims	Location Certificate in Lincoln County Records
Ridge 1 & Ridge 2	Book R-1, Page 130, 131, 132
Bluebird Fraction	Book W-1, Page 233
Bluebird 15	
Bluebird 16	
Atlanta Star No. 3	Book W-1, Page 234

(2) ONE (1) PATENTED MINING CLAIM SPECIFICALLY DESIGNATED AS:

Conway and Bradshaw lode mining claim, U. S. Survey No. 37, Mineral Certificate No. 3, as recorded in the office of the County Recorder of Lincoln County, Nevada, in Book "C-1" of Miscellaneous at Page 328.

(3) ELEVEN (11) PATENTED MINING CLAIMS, being:

Atlanta #1, Atlanta #2, Atlanta #3, Atlanta Strip, Atlanta Strip #1, Atlanta Home, Pactaolian Fraction (Survey No. 3915, Patent No. 282689), Sparrow Hawk, Hillside and Belle, all recorded in Book "A-1", page 376 of the Official Records of the County Recorder of Lincoln County, State of Nevada.

Minnett & Hayes (Survey No. 3290) Recorded in Book "B-1", page 37 of the Official Records of the County Recorder of Lincoln County, State of Nevada.

(4) SIXTY (60) UNPATENTED MINING CLAIMS, being:

Gem Nos. 1 to 5 inclusive, Eastline Nos. 1 to 7 inclusive; Atlanta Star Nos. 1 to 3 inclusive; Mid and Mid Nos. 1 and 2; Millsite; Millsite Nos. 1, 3, 4, 5, and 8; Moab; Moab Nos. 1 to 12 inclusive; Townsite Nos. 1 to 15 inclusive; Minnett & Hayes Nos. 2 to 6 inclusive; Suday Nos. 1 to 4 inclusive, EXCEPT Atlanta Star No. 3, referred to in paragraph 1 hereof;

(5) SIXTY-FIVE (65) UNPATENTED MINING CLAIMS, being:

Cabin Strip, recorded in Book R-1, page 191; Ajax #1 to #10 inclusive, recorded in Book R-1, pages 76, 77, 187, 188, 189, 190; Cabin #3 to #20, inclusive, recorded in Book R-1, pages 192 to 199; Cedar Strip, recorded in Book R-1, page 191; Cedar #1 and #2, recorded in Book R-1, page 190; Eagle #1 and #2, recorded in Book R-1, page 352, Westline #1 to #10, inclusive, recorded in Book R-1, pages 72, 73, 74, 75 and 76, Jean Bee, recorded in Book R-1, page 321; Jean #1 to #20, inclusive, recorded in Book R-1, pages 102, 321 to 329, inclusive, all recorded in the Official Records of the County Recorder of Lincoln County, State of Nevada;

(6) THIRTY-SIX (36) UNPATENTED MINING CLAIMS SPECIFICALLY DESIGNATED AS:

Blue Bird Nos. 1 to 17 inclusive
Big Four
Big Four Nos. 1 to 5 inclusive
Phil D
Bradshaw Nos. 1 to 12 inclusive

as recorded in the office of the County Recorder of Lincoln County, Nevada, EXCEPT Blue Bird Nos. 15 and 16, referred to in paragraph 1 hereof;

(7) FOUR (4) UNPATENTED MINING CLAIMS

Ridge Nos. 1-4, inclusive, location certificates recorded at Book R-1, Pages 130, 131 and 132, Lincoln County, Nevada, records, EXCEPT Ridge Nos. 1 and 2, referred to in paragraph 1 hereof;

(8) SIX (6) UNPATENTED MINING CLAIMS

Minnie, Tip Top, Lucky Dog, Lucky Dog No. 1, Lucky Dog No. 2, and Lucky Dog No. 3, all as recorded in the office of the County Recorder of Lincoln County, Nevada

(9) THREE (3) UNPATENTED MINING CLAIMS

Claim	Book and Page
Hogan	Book W-1, Page 268
Lake Valley Mill Site	Book W-1, Page 211
Lake Valley Mill Site No. 2	Book W-1, Page 311

All claims are in good standing and assessment work has been completed for 1970.

LEGAL STATUS OF CLAIMS

A title opinion has been rendered by Johnson, Volk and Young, attorneys at law, Denver, Colorado. All their requirements have been met and, it is their opinion that Golden Cycle has an unencumbered clear title to all claims in question.

HISTORY

The Atlanta Mine has had a long history of development and investigation which culminated in some limited bullion production in 1966 by A & B Gold Silver Mines. Development began around 1905 in search of high grade gold, with two shafts, drifts and crosscuts from each. The investigations are recorded briefly in chronological order below. Summaries of the more important investigations follow.

1910	Kislingbury, George:	Report to E. M. Bray
1913	Timmons, Colin:	Promotional Report
	Stubonbord, J. J.:	Atlanta Cons. Mining Co.
	Cosby, F. N.:	Development Engineer
1914	Abbott, J. W.:	Min. & Sci. Press - Ore Genesis
1915	Stubonbord, J. J.:	Mine Mgrs. Report
	Myers, Paul:	EMJ "Developments at Atlanta"
	Kirby, Thomas:	Reserve Estimates, Cyaniding Proposal
1916	Hill, James M.:	USGS Bull 64B
1923	Hewett, D. F.:	EMJ, Vol. 115, "Carnotite in So. Nevada"
1934	Longyear, E. J.:	Channel Sampling and Appraisal
1936	Perez, R. A.:	Metallurgical Report to Penobscot Mining Co.
	Morgan, R.:	Property Evaluation
	Swart, W. G.:	Evaluation Based on 5 mos. Sampling
1950	Gordon, L. E.:	RFC Geologic Appraisal-Sampling
1954	Dobson, P.:	Appraisal - Clyde Collins
1955	Collins, Clyde:	22,000 Tons Shipped to McGill
1958	Joralemon, P. J.:	Camp Bird Sampling
1959	Smith, L. E.:	Northfield Mines Sampling
1961	Smith, L. E.:	Hover Construction - Sampling
1966	A & B Gold-Silver Mines, Inc.	Install Water 500 TPD Cyanide Mill-Power, Limited Production
1969	Golden Cycle:	Complete Feasibility Study, 5,000 Feet of Drilling

DEVELOPMENT

The principal mine, the Atlanta, was developed through two shafts almost 300 feet apart, started around 1905. From the southern shaft on the 20 foot level a diagonal drift ran 110 feet to the footwall, half of the way through rich breccia; on the 55 foot level a 70 foot drift ran north and south through rich breccia and on the 82 foot level a 50 foot drift ran northerly and a 120 foot diagonal drift tested the lower part of the mineralized breccia. The north shaft was sunk in rhyolite porphyry, reaching a bulge of the silicification into the hanging wall at the first or 100 level. A crosscut ran 140 feet east to the footwall, a winze was sunk in the center of the richest breccia 75 feet from the shaft station and a drift was driven from the winze collar 280 feet southward with a diagonal running 75 feet southeastward to connect by raise with the 82 level. The shaft was then sunk to the 400 level, entering the footwall at about the 200 level. The 200 level crosscut ran 40 feet into the footwall and 90 feet westerly to the hanging wall. From the crosscut the 200 level drift ran 450 feet southerly roughly following the irregular footwall. Crosscuts were run from the footwall toward the hanging wall at five additional places approximately 100, 200, 300, 365 and 450 feet south of the shaft crosscut. A raise was driven from the 200 to 100 levels for ventilation. On the 400 level a crosscut ran 210 feet westward toward the silicified

breccia zone, a drift wandered 150 feet southerly following a gold-bearing mud-filled fissure in dolomite, and a second 60 foot crosscut ran from the drift toward the breccia zone. All told, the old development in search of high grade custom ore consisted of about 480 feet of shaft sinking, 1710 feet of level development, 31 feet of winze and 120 feet of raising.

In 1954 and 1955 the Atlanta Gold and Uranium Company and its contractors mined and shipped 22,000 tons of breccia from a narrow pit at the south shaft. The breccia was sold as flux to the Kennecott Copper Corporation smelter at McGill. The settlement sheets show a weighted average gold content of 0.33 ounces of gold per ton and a weighted average silver content of 1.16 ounces per ton. At current prices ($35.00 per ounce for gold, $1.29 per ounce of silver) the flux had an average value of $13.05 per ton.

In 1961 the Hoover Construction Company extended the level development slightly by driving a short crosscut toward the footwall on the 100 level 100 feet south of the north shaft; by extending the 100 foot south crosscut on the 200 level to the hanging wall; by drifting along the 200 level footwall to 100 feet north of the main shaft, and by raising across the breccia zone from the 200 level 410 feet south of the main shaft.

McKinney Mines, Ltd., later extended the 200 level development by driving the drift about 275 feet farther southward and raising across the breccia zone at three places about 540, 620 and 670 feet south of the main shaft. They also raised across the breccia zone near the end of the Hoover Construction extension of the level north of the shaft and ran a sublevel 160 foot toward and into the footwall from the raise.

In 1966 the A 7 B Gold-Silver Mines, Inc., cyanided nearly 27,000 tons of mineralized breccia from shallow cuts and benches mined under contract by Hoover-McGhan, Inc.. Bullion shipped to the San Francisco mint totalled 3724.719 fine ounces of gold and 4700.44 fine ounces of silver, a recovery of 0.138 ounces of gold and 0.17 ounces of silver per ton milled, worth, at current prices, $5.05 per ton. These operations have effectively blocked both shafts, preventing further access to the underground development which by now totalled 480 feet of shafts, 2350 feet of levels and sublevels and about 695 feet of raises and winze.

The Bradshaw Mine near the south end of the property was developed for silver. It consists of one adit entry 50 feet into spottily mineralized breccia, 85 feet of crosscut, an incline 30 feet long to a 25 foot lower level and a 10 foot winze. The portal drift and main level crosscut appear to be well mineralized. Five area and channel samples collected from the walls in 1961 averaged 0.21 ounces of gold and 6.42 ounces of silver per ton.

The Hulse or Blue Bird Mine, also on the property, consists of a 90 foot 40 degree inclined shaft with 170 feet of level development at the 25 and 50 foot levels. Two carlots of breccia containing 0.30% U_3O_8 in the form of yellow coatings have been shipped. Gold and silver mineralization appears to be negligible but molybdenum (Mo) assays up to 0.541% have been reported.

GEOLOGY

The mineralized rocks of the Atlanta Mining District consist of a series of gently and uniformly northeast-dipping Ordovician sediments in fault contact with intrusive rhyolite porphyry. The sediments include the Tank Hill dolomite and the successively overlying Eureka quartzite and Ely Springs dolomite. Although the area is block-faulted on both northwest and east-west systems, the outcrop relationships are generally compatible with the northeast dip. The western limit of outcrop of these sediments is generally an overlap of much younger bedded rhyolite tuff. At the Atlanta Mine, however, the Ely Springs dolomite is in fault contact with massive rhyolite porphyry which is exposed at surface in a small area near the fault but otherwise overlain by the rhyolite tuff.

The Atlanta fault strikes north-south, dips westward through the mine development at inclinations of 40 to 90 degrees; both the rhyolite and dolomite have been copiously silicified and locally mineralized with gold, silver and uranium. This is commonly a selvage of partially unreplaced rhyolite in which the porphyritic texture is preserved.

Much of the silicified zone is obviously a fault breccia showing angular to rounded fragments, refragmentation, and ferruginous staining. There are also portions with black coatings and impregnations suggesting manganese content. There is no appreciable difference between the surface breccia and that at the 200 level in the mine.

The dolomitic footwall has been decarbonatized along much of the silicified zone resulting in a clay-silt residuum which has been mistaken for altered dike. Near the contact and along fissures are solution caves of some magnitued. These have resulted in unequal subsidence of the silicified breccia causing recent intricate and unsilicified fracturing. Openings in the breccia have been refilled with an argillaceous material resembling fault gouge but probably originating at the weathering surface of the rhyolite porphyry and washed downward.

Gold and silver occur most abundantly in the silicified breccia where the breccia is widest, most ferruginous, and most fractured by subsidence. Gold occurs in part at least as native metal of high fineness. The gold values appear to decline gradually with increasing depth and to be highest on any level near the dolomitic footwall. Very fine free gold occurs in the muddy back-filling of the caves in the footwall dolomite. The silver minerals remain unidentified but are probably chlorides and related oxidized forms.

The transitional silicification marginal in most places to both the hanging wall and footwall of the breccia zone tends

to be lean. The lobes of silicification bulging into the wall rocks tend to be transitional. The rhyolite porphyry hanging wall may be weakly mineralized but the dolomite footwall is unaltered and barren.

The mineralized silicified breccia zone dips generally westward on a west slope. The underground development shows a general inclination considerably steeper than the slope, uniformly 40 to 50 degrees between the 100 and 200 levels. However, since the 400 level did not penetrate the breccia zone at the projection of this inclination, and bodies of very lean breccia are plastered on the slope above the mine, there is a possibility that the breccia zone is little steeper than the slope except in the developed portion of the mine. Assay tonnage estimates show a marked two lobed effect of major tonnages with foci of the lobes at 0+50 South, 1+25 East and 2+50 South,1+25 East, this statistical plot indicates some east west structure (probably fault) that is influencing the mineralization. (See graphs of 150E longitudinal Section).

The water table is some distance below the 400 level and all rocks in and above the mine development have been severely altered by weathering. Apparently the original silicified breccia mineralization included pyrite, since altered by weathering to produce the ferruginous stain and the carbonate-dissolving sulfurous acid. Ferruginous stain in the altered rhyolite porphyry indicates a weaker but pervasive mineralization of this intrusive rock.

The pattern of gold and silver assays indicates mineral migration in the zone of weathering. The gold seems to have been concentrated near surface and particularly along the footwall by downward percolation with water of the finely divided metal liberated by the weathering of the breccia outcrop; silver appears to have been leached from the more permeable near-surface of the breccia mass.

At the Bradshaw Mine at the south end of the property the mineralization is similar but more heavily weighted to silver.

EXPLORATION 1969

Phase I of drilling at Atlanta was initiated to corroborate the value and tonnage estimates presented to Cycle by A & B Gold-Silver Mines (Robert Jordan et al). All previous work indicated 1,200,000 tons, having a gross assay value of 0.14 oz. Au and 1.78 oz. Ag.

4787 feet of drilling completed September 10, 1969 indicate 1,186,000 tons of ore averaging 0.16 oz. gold and 1.66 oz. silver. These tonnage and value figures are either the direct result of our drilling or other reputable tonnage/value figures of previous investigators.

Hammer - Portadrill

Initially it was thought that the most reliable samples could be obtained by core drilling; due to extremely high diamond cost the core drilling was terminated shortly after our initial attempt. A mission hammer was acquired and

3,717 of hammer drilling was completed during 53 days of work. Sample recovery was kept near 100% by varying the water soluable oil - water consistency and catching the sample in a pan-like device at the collar. All samples collected were placed in drums and sealed at the drill site.

Periodically 30 drum lots were shipped to the lab in Colorado Springs. The sample discrepancies evident in other programs were kept at a barest minimum using this procedure.

Air Trac - Copco

1,070 feet of 3-1/2" air trac percussion drilling was completed during 24 days of work at Atlanta. The sample recovery was not as good as the Hammer drill but valuable information was still obtained. Unavoidable "dusting" will cause the assay value to be approximately 10% low.

Drilling Coverage

A total of 46 holes were located along a 700 foot strike length and a 200 foot width. In general, all holes are within 50 feet of each other giving us a permissible projection distance for tonnage estimates. See plan-view map illustrating all drill hole location.

ATLANTA DRILLING

5" HAMMER DRILL HOLES (PORTADRILL)

HOLE NUMBER	COLLAR ELEVATION	LOCATION	ORE ZONE	SEC. PLOT	TOTAL DEPTH	WEIGHTED AU	ASSAYS AG	COMMENTS
HTDH - A-1	6,750'	300 s 050 e	0' to 60' (60)	300 South	120'	0.19	0.46	
HDH - A-2	6,751'	270 s 000	20' to 130' (110)	250 South	150'	0.15	2.32	
HDH - A-3	6,752'	235 s 060 w	-- --	200 South	180'			
HDH - A-4	6,752'	300 s 100 e	0' to 20' (20)	300 South	40'	0.15	0.52	lost air
HDH - A-5	6,752'	319 s 100 e	-- --	300 South	35'	---	---	lost air
HDH - A-6	6,757'	350 s 100 e	10' to 40' (30)	350 South	35'	0.18	0.42	lost air
HDH - A-7	6,761'	425 s 115 e	30' to 60' (30)	400 South	85'	0.14	0.19	
HDH - A-8	6,772'	365 s 050 e	50' to 65' (15)	350 South	65'	0.16	0.75	lost air
HDH - A-9	6,755'	500 s 050 e	70' to 90' (20)	500 South	145'	0.12	0.45	will deepen
HDH - A-10	6,753'	435 s 035 w	60' to 76' (16)	450 South	75'	0.13	0.55	will deepen
HDH - A-11	6,751'	305 s 040 w	110' to 125' (15)	300 South	125'	0.17	2.47	just into ore
HDH - A-12	6,765'	175 s 060 w	lean ore --	150 South	255'	----	----	lean ore
HDH - A-13	6,780'	050 s 025 w	90' to 150' (60)	50 South	155'	0.07	5.09	high silver
HDH - A-14	6,783'	095 s 018 e	110' to 140' (30)	100 South	145'	0.07	2.12	lean ore
HDH - A-15	6,785'	160 s 045 e	25' to 50' (25)	150 South	50'	0.20	0.66	*throw out high Au values
HDH - A-16	6,785'	155 s 035 e	20' to 150' (130)	150 South	190'	0.16	1.56	*throw out high Au values
HDH - A-17	6,835'	155 n 000	--- --- --	150 North	125'	----	----	lean ore
HDH - A-18	6,865'	115 n 080 e	0' to 40' (40)	100 North	85'	0.14	0.74	
HDH - A-19	6,742'	460 s 065 w	70' to 124' (54)	450 South	124'	0.08	3.21	
HDH - A-20	6,751'	405 s 045 w	-- -- --	400 South	did not drill			
HDH - A-21	6,751'	335 s 070 w	160' to 200' (40)	350 South	205'	0.22	2.18	
HDH - A-22	6,745'	075 s 150 w	-- -- --	50 South	360', No ore			
HDH - A-23	6,780'	100 s 030 w	170' to 230' (60)	100 South	235'	0.16	2.53	
HDH - A-24	6,782'	025 n 020 w	140' to 220' (80)	000	223'	0.06	2.97	
HDH - A-25	6,783'	075 n 050 w	-- --	50 North	240', No ore			
HDH - A-26	6,846'	445 n 000	30' to 40' (10)	450 North	75'	0.12	0.42	
HDH - A-27	6,835'	245 n 000	-- -- --	250 North	105', No ore			
HDH - A-28	6,772'	415 s 0468e	60' to 90' (30)	400 South	90'	0.27	0.69	

TOTALS 9/15/69

Total Number Holes Drilled 27
Total Footage 3,717'
Total Ore Zone Influence 875'
Total Tonnage Influence @ 628 tons/vert foot.....549,500

RESERVE CALCULATIONS OF MINERALIZED BRECCIA

Reserves calculated in this report are restricted to major, uninterrupted thicknesses of mineralized breccia with gross metal content of at least $3.00 per ton - the estimated amount required to balance mining and milling costs. This figure would be considerably less when considering the heap leaching aspect.

There have been at least five (5) different, reputable mining groups which have investigated this ore body independently of each other as to its size and grade. Without exception they have all arrived at about the same reserves and value, that is 1,200,000 tons of ore that will average 0.16 oz. gold and 1.7 oz. silver.

The methods employed to arrive at these values have varied according to the engineer in charge. Basically, however, they have applied all information from underground development to surface drilling on geologic cross sections and divided the cross sectional area into "tonnage blocks," then assigned the appropriate assay values to the blocks.

Our exploration work confirms the existence of 1,186,000 tons of ore. (See attached cross sections and tonnage block diagrams). The area of influence (see plan view for

coordinate location) extends from 1 + 25 N to 5 + 25 S, a total strike length of 650'. The drilling indicates a minable (open pit) depth to 250'. Total volume has been converted to tons assuming 12.5 cubic feet of breccia per ton.

ASSAYS AND WEIGHTED VALUES

Find following all assays from Atlanta drilling. Some significant facts come to light:

(1) There are high grade zones (possibly coarse free gold) at or near hanging wall contact in subsidence fractures.

(2) The most massive (hardest drilling) carries the highest and most persistent values.

(3) There are interbedded zones of low-grade material, commonly old solution channels filled with Rhyolitic material.

(4) The transitional silicification marginal in most places to both the hanging wall and footwall of the breccia zone tends to be lean.

(5) The lobes of silicification bulging into the wall rocks tend to be transitional.

(6) The rhyolite hanging wall is weakly mineralized but the dolo/ls footwall is barren.

(7) The silver values increase markedly at or near 100 foot level and toward the hanging wall.

In all calculations for weighted assay footages, anomalously high values were disregarded and the averages for the hole applied to these footages. See logs for example.

WEIGHTED ASSAYS - HAMMER DRILL

HDH	ORE ZONE	1 ORE ZONE FOOTAGE	2 WEIGHTED OUNCES Au	3 WEIGHTED OUNCES Ag	1 x 2 Total Au	1 x 3 Total Ag	Comments
A1	0 - 60'	60'	0.19	0.46	11.40	27.60	
A2	20 -130'	110'	0.15	2.32	16.50	25.52	
A3	- -	-	-	-	-	-	No ore
A4	0 - 20	20'	0.15	0.52	3.00	10.40	
A5	- -	-	-	-	-	-	Not used (Inc.)
A6	10 - 40'	30'	0.18	0.42	5.40	12.60	
A7	30 - 60'	30'	0.14	0.19	4.20	5.70	
A8	50 - 65'	15'	0.16	0.75	2.40	11.25	
A9	70 - 90'	20'	0.12	0.45	2.40	9.00	
A10	60 - 76'	16'	0.13	0.55	2.08	8.86	
A11	110 -125'	15	0.17	2.47	2.55	37.05	
A12	- -	-	-	-	-	-	No ore
A13	90 -150'	60'	0.07	5.89	4.20	353.40	
A14	110 -140'	30'	0.07	2.12	2.10	23.60	
A15	25 - 50'	25'	0.20	0.66	5.00	16.50	
A16	20 -150'	130'	0.28	1.56	36.25	202.80	
A17	- -	-	-	-	-	-	No ore
A18	0 - 40'	40'	0.14	0.74	5.60	29.60	
A19	70 -124'	54'	0.08	3.21	4.32	173.34	
A20							Not drilled
A21	160 -200'	40'	0.22	2.18	8.80	87.20	
A22	- -	-	-	-	-	-	No ore
A23	170 -230'	60'	0.16	2.53	9.60	151.80	
A24	140 -220'	80'	0.06	2.97	4.80	237.60	
A25	- -	-	-	-	-	-	No ore
A26	30 - 40'	10'	0.12	0.42	1.20	4.20	
A27	- -	-	-	-	-	-	No ore
A28	60 - 90'	30'	0.27	0.69	8.10	20.70	
TOTAL		875.00			139.90	1,448.72	

Weighted Gold = $\frac{139.90}{875.00}$ = 0.1598857 0.16

Weighted Silver = $\frac{1,448.72}{875.00}$ = 1.655680 1.66

combination core hole and hammer hole
DDH - A-1 or HDH-A1

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coörd. : N 3+00SOUTH	BEARING	HOLE Nº HDH - A-1
E 0+50EAST	INCL. VERTICAL	COLLAR ELEV. 6750'
START COMPL.		DEPTH 120

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING—RMKS.
0' - 18' Silicified dolomite breccia, in old pit area top 18' is badly broken by previous blasting. The breccia is grey to light brown with moder. to heavy FeO_x.									0.15	0.66		
									0.15	0.34		
									0.06	0.36		
									0.31	0.91		
18' - 118' Silicified dolomite breccia., broken to somewhat massive, moderate amounts of FeO_x in fractures filled with sec. carbonate, grey to blue grey.									0.28	0.42		25'
									0.28	0.42		
									0.17	0.28		
									0.20	0.49		
									0.27	0.39		50'
									0.13	0.39		
									0.06	0.35		
									0.16	0.35		75'
									0.07	0.39		
									0.10	0.39		
												100'
118' - 120' Dolomitic/ls light br. to grey. heavly silicified does not react to HCl unless powdered.									0.09	0.20		
									0.01	0.20		
												120'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 2+70 SOUTH	BEARING	HOLE Nº HDH - A-2
E 0+00	INCL. VERTICAL	COLLAR ELEV. 6751'
START COMPL.		DEPTH 150'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0' - 18' Admixed broken popphoritic rhyolite and brecciated material, very likely is sec. fill from previous pit work.									0 Tr	0.10		
									0.04	0.55		
18' - 140' Silicified dolomite breccia. Grey to grey blue, Heavy amts of FeO_x some sec. Carbonate broken and vuggy.									0.12	0.54		25'
									0.11	0.57		
									0.30	1.87		
									0.19	.78		50'
									0.22	1.21		
									0.03	1.39		75'
									0.11	2.73		
									0.18	3.30		
									0.17	4.65		100'
									0.13	4.69		
									0.12	2.91		125'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT _____

Coord. : N	BEARING	HOLE Nº HDH - A-2
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	AU oz	Ag oz	% EQUIV.	GROUPING — RMKS.
									0.09	1.91		
									No Sample Return			
												150'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 2+25 SOUTH	BEARING	HOLE Nº HDH - A-3
E 0+80 WEST	INCL. VERTICAL	COLLAR ELEV. 6752'
START COMPL.		DEPTH 180'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz. Au	oz. Ag	% EQUIV.	GROUPING — RMKS.
0' - 138' Porphoritic rhyolite buff to white with seams of FeO_x giving a general red appear. Phenocrysts of quartz, loosely consolidated becoming somewhat silicified? near ore zone												
												25'
No samples taken for assay purposes in this HW zone.												50'
												75'
												100'
												125'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT

Coord. : N	BEARING	HOLE Nº HDH - A-3
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
138' - 160' Top part of brecciated zone. Admixed silicified dol. breccia and porphoritic rhyolite. very heavy FeO_x in fractures and soln. channels. Breccia from grey to blue grey.								0.05	0.99		
											150'
								0.06	0.93		
								00.03	0.64		
								0.03	1.13		
											180'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N 3+00 SOUTH	BEARING	HOLE Nº HDH - A-4
E 1+00 EAST	INCL. VERTICAL	COLLAR ELEV. 6752'
START COMPL.		DEPTH 40'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0' - 5' Cherty Quartz zone, some jasperoid like material, small amts. brecciated material, light blue to grey.									0.23	0.66		
									0.07	0.39		
5'-20' Silicified dolomite breccia, small amts of disseminated rhyolite, broken												25'
20' - 35' Silicified dolomite breccia, light grey to brown very massive and vuggy. only small amount of sample returned therefore no assay amts.									no sample			
												40'
									no sample			

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coord. : N 3+19 SOUTH	BEARING	HOLE Nº HDH - A-5
E 1+00 EaST	INCL. VERTICAL	COLLAR ELEV. 6752'
START COMPL.		DEPTH 35'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0' - ? Silicified dolomite breccia and admixed rhyolite in old pit area, poor sample return, badly broken and vuggy.									0.05	0.20		
									no sample			
									no sample			
									no sample			35'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N 3+50 SOUTH	BEARING	HOLE Nº HDH - A-6
E 1+00 EAST	INCL. VERTICAL	COLLAR ELEV. 6757'
START COMPL.		DEPTH 35'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0' - 5' Admixed rhyolite and brecciated material.									0.04	0.15		
									0.24	0.44		
												20'
5'-27' Silicified dolomite breccia, Heavy FeO_x, broken and vuggy, light grey to blue.									0.17	0.39		
									0.12	0.44		
												40'
27' - 35' Silicified dolomite breccia, Heavy FeO_x light brown vuggy, but massive, small amts. disseminated rhyolite.												

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coord. : N 4+25 SOUTH	BEARING	HOLE Nº HDH - A-7
E 1+15 EAST	INCL. VERTICAL	COLLAR ELEV. 6761'
START COMPL.		DEPTH 65'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0' - 5' Rhyolite tuff, white to buff, loosely consolidated, heavily stained with FeO_x									Tr	0.13		
									Tr	0.37		
5' - 30' Porphoritic rhyolite. white to buff, seams of FeO_x phenocrysts of quartz.									Tr	0.12		20'
30' - 59' SILICIFIED Dolomite breccia, light brown to grey massive to broken and vuggy. moderate amounts FeO_x									0.16	0.35		
									0.16	0.19		40'
									0.11	0.07		60'
59' - 65' Dolomitic/limestone light brown to tan, grading to grey, moderate reaction to HCl.									Tr	0.07		65'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coord. : N 3+65 SOUTH	BEARING	HOLE Nº HDH - A-8
E 0+50 EAST	INCL. VERTICAL	COLLAR ELEV. 6772'
START COMPL.		DEPTH 65'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS
0' - 46' Rhyolite tuff, white to buff with seams of FeO_x												
No sample taken in this zone for assay purposes. (HW)												25'
									0.04	0.16		
46' - 65' Silicified dolomitic breccia. Blue to light grey, massive to vuggy, moderate amts of FeO_x												50'
									0.10	0.69		
									0.27	0.87		65'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N	BEARING	HOLE Nº
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz A8	% ECUIV.	GROUPING — RMKS.
113'-145' Dolomitic-Limestone Buff to Reddish brown, massive reacts vigorously only when powdered.									Tr	0.51	17.6	130
									TR	0.09	3.2	

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N 4+35 SOUTH	BEARING	HOLE Nº HDH - A-10
E 0+30 WEST	INCL. VERTICAL	COLLAR ELEV. 6753'
START COMPL.		DEPTH 75'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0' - 50' Rhyolite tuff, buff to white, moderate amts. of FeO_x in stringers and cavaties. loosely consolidated, occasionally lapilli of primarily quartz composition.												
												25'
No sample taken for assay purposes in this zone.												
									Tr	0.7[illegible]		50'
									0.04	0.44		
50' - 57' Quartzose transitions zone of some brecciated material occasional jasperoid type seen, Heavy FeO_x in fractures and cavities.												
									0.07	0.37	12.8	
57' - 75' Silicified dolomite breccia, light blue to grey, moderate amounts of FeO_x massive and vuggy.									0.23	0.86	29.6	75'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 2

PROJECT ATLANTA

Coörd. : N 3+25 SOUTH	BEARING	HOLE Nº HDH - A-11
E 0+40 WEST	INCL. VERTICAL	COLLAR ELEV. 6751'
START COMPL.		DEPTH 125'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0' - 61' Rhyolite tuff, buff to white varying amounts of FeO_x (heavy limonite 20'-30') loosely consolidated									0.02	0.42		
												10
									0.04	0.54		
												20
									0.01	0.20		25'
												30
									0.05	0.07		
												40
									TR	0.04		
												50'
									TR	0.14		
61' - 97' Porphoritic rhyolite, phenocrysts of quartz, moderate to heavy amounts of FeO_x, felsitic ground mass. loosely consolidated until 90'												
									0.01	0.06		
									0.02	0.10		75'
									TR	0.04		
									TR	0.06		
97' - 125' Silicified dolomite breccia, light blue to grey grading to light brown near bottom, massive to vuggy and broken, moderate to heavy amounts of FeO_x.												100'
									0.01	0.45		
												110
									0.15	2.52		Au=0.17 Ag=1.65
									0.24	4.86		125'

LOGGED BY _____ DATE _____

HDH - A-12

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT ATLANTA

Coörd. : N 1+75 SOUTH	BEARING	HOLE Nº HDH - A-12
E 0+60 WEST	INCL. VERTICAL	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
												150'
					155-160				0.08	0.87		
									0.03	0.51		
									0.05	0.23		175'
									0.08	0.41		
									0.05	0.93		
												200'
									0.04	0.49		
									0.04	0.17		
									0.07	0.35		225'
												230'
												250'

LOGGED BY DATE

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 0+50 SOUTH	BEARING	HOLE Nº HDH - A-13
E 0+25 WEST	INCL. VERTICAL	COLLAR ELEV. 6780'
START COMPL.		DEPTH 155'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
												25'
												50'
									0.03	0.23		
									0.06	1.36		75'
									0.02	2.47		
												90'—
									0.04	6.09		
												100'
									0.05	7.14		
									0.10	5.40		
									0.08	4.05		125'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N	BEARING	HOLE Nº
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
												130'
									0.06	5.40		
									0.08	7.32		
												150'
									0.08	1.49		155'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 0+95 SOUTH	BEARING	HOLE Nº HDH - A-14
E 0+18 EAST	INCL. VERTICAL	COLLAR ELEV. 6783'
START COMPL.		DEPTH 145'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0' - 46' Rhyolite tuff, buff to white with heavy amounts of FeO_x in stringers and cavities												
no sample taken in this zone for assay purposes.												25'
46' - 58' Porphoritic rhyolite, felsitic groundmass, phenocrysts of quartz, moderate amounts of FeO_x in fractures and cavities,												50'
									0.04	2.25	22.5	
58' - 63' Quartzose transitions zone of somewhate brecciated material, heavy FeO_x, vuggy												
									0.07	1.35	13.5	
63' - 145' SILIcified dolomite breccia zone, blue to grey, massive to broken with occasional vugs, moderate amounts of FeO_x Interbedded rhyolite from(94' to 107') Actually admixed zone of breccia and rhyolite.												75'
									0.12	2.36	23.6	
									0.07	2.47	24.7	
									0.03	0.96	9.6	100'
									0.04	1.01	5.05	lean ore
									0.13	2.08	20.8	
									0.03	1.77	17.7	125'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT ATLANTA

Coord. : N	BEARING	HOLE Nº
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
												130'
									0.06	2.40	24.0	
												lean ore
												145'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N 160 SOUTH	BEARING	HOLE Nº HDH - A-15
E 0+45 EAST	INCL. VERTICAL	COLLAR ELEV. 6785'
START COMPL.		DEPTH 50'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0' - 27' Rhyolite tuff, buff to white, thin seams and cavities filled with FeO_x loosely consolidated												
												25'
27' - 34' Porphoritic rhyolite buff to white, felsitic ground-mass, phenocrysts of quartz, heavy amounts of FeO_x									0.07	0.87		0.20 from 25-40 also applied to 40'-50' High Value thrown out.
									0.26	1.09		
									0.20	.96		
34' - 50' Silicified dolomite breccia, tan to light brown, some admixed porphoritic rhyolite heavy FeO_x												50'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N1+55 SOUTH	BEARING	HOLE Nº HDH - A-16
E0+35 EAST	INCL. VERTICAL	COLLAR ELEV. 6785'
START COMPL.		DEPTH 190'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0' - 16' Rhyolite Tuff, white to buff, seams and cavities filled with FeO_x, loosely consolidated												
16' - 76' Silicified dolomite breccia, light grey, grading to a light brown near 58', moderate to heavy FeO_x in fractures and cavities, massive to broken and vuggy									0.17	1.69		25'
									0.25	.69		
									1.70	6.03		
									1			50'
									1.45	1.83		
									1.10	1.26		
									0.16	.96		75'
76' - 92' Interbedded silicified dolomite breccia and tuffaceous rhyolitic material, heavy FeO_x in fractures and cavities. Broken andvvuggy.									0.07	1.07		
									0.07	1.26		
92' - 152' Silicified dolomite breccia, light blue to grey, massive, occasionally vuggy. moderate amts of FeO_x in fract.												100'
									0.12	2.13		
									0.28	3.70		
									0.21	1.95		125'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT ATLANTA

Coörd. : N	BEARING	HOLE Nº
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS
												130'
									0.15	1.09		
												140'
									0.09	.52		
												150'
									0.03	0.29		
									Tr	0.17		
									Tr	0.17		175'
									Tr	0.14		
												190'
												Zone from 40'-70' thrown out, and avg from rest of hole applied to this 30' zone.
												Au=1.57/10=0.16
												Ag=10.15/10=1.01
												Above values applied to Anomalous zone from 40'-70'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coord. : N 1+55 NORTH	BEARING	HOLE No HDH - A-17
E 0+00	INCL. VERTICAL	COLLAR ELEV. 6835'
START COMPL.		DEPTH 125'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
									0.02	0.35		
									0.02	2.99		
									0.09	0.35		25'
									0.01	0.09		
									0.01	0.29		
									Tr	1.25		50'
									Tr	0.13		
									Tr	0.17		75'
									0.01	0.12		
									Tr	0.12		
									Tr	0.12		100'
									Tr	0.1[illegible]		
									Tr	0.14		125'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coörd. : N 1+55 NORTH	BEARING	HOLE Nº HDH A-18
E 0+80 EAST	INCL. VERTICAL	COLLAR ELEV. 6865'
START COMPL.		DEPTH 125'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
									0.13	0.49		
												10'
									0.13	1.64		
												20'
									0.22	0.58		
												30'
									0.08	0.21		
												40'
												0'-40'
												Au= 0.14
												Ag= 0.49

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N 4+60S	BEARING	HOLE Nº HDH-A-19
E 0+65W	INCL. Vertical	COLLAR ELEV. 6742'
START COMPL.		DEPTH 124'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0-72' Rhyolite tuff, buff to white, moderate amounts of FeOx in stringers and cavaties, loosely consolidated, some brecciated material near bottom of zone												
												25'
												50'
									0.04	2.01		
									0.02	1.80		
72'-116' Silicified dolomite breccia light blue-grey, moderate to heavy amounts of FeOx in susidence fractures and cavities massive to broken and vuggy.								0.80	0.08	1.21	12.1	75'
								1.10	0.11	0.65	6.50	
								0.70	0.07	2.90	29.0	
												100'
116'-119' Transition zone of Breccia fingers in Dol./LS Footwall								0.90	0.90	4.06	40.6	
119-124' Limestone/Dol. somewhat silicified; black to grey								0.60	0.60	4.41	44.1	
								0.20	0.05	4.17	41.7	

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT Atlanta

Coörd. : N 4+05 S	BEARING	HOLE Nº HDH-A-20
E 0+45 W	INCL. Vertical	COLLAR ELEV. 6751
START COMPL.		DEPTH Not drilled

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz	oz	% EQUIV.	GROUPING — RMKS
Need Dozer For DH Location												

LOGGED BY DATE

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT Atlanta

Coörd. : N 3+35S	BEARING	HOLE Nº HDH-A-21
E 0+70W	INCL. Vertical	COLLAR ELEV. 6751'
START COMPL.		DEPTH 205'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0-155 Rhyolitic tuff-porphoritic rhyolite, buff to white, stringers and subsidence fractures filled with FeOx												
												25'
No sample taken in this HW Zone												50'
												75'
												100'
												125

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT ATLANTA

Coörd. : N	BEARING	HOLE Nº
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz	oz	% EQUIV.	GROUPING — RMKS.
155'-162' Transition zone quartzone (cherty zone) small amts of brecciated material moderate amts of FeOx in fractures												150'
									0.06	0.84		
									0.35	1.14		
									0.30	3.01		175'
									0.15	2.78		
									0.07	1.78		
									0.04	0.85		205'

LOGGED BY _____ DATE _____

HDH-A-22

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet ___ of ___

PROJECT ATLANTA

Coörd. : N 0+75S	BEARING	HOLE Nº HDH-A-22
E 1+50W	INCL. Vertical	COLLAR ELEV. 6745'
START COMPL.		DEPTH 360'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz	oz	% EQUIV.	GROUPING — RMKS.
Has not been logged												50'
												100'
												150'
												200'

LOGGED BY ___ DATE

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT

Coörd. : N	BEARING	HOLE Nº
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
												300'
									Tr	0.27		
									Tr	0.34		
									Tr	0.37		360'

LOGGED BY DATE

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N 1+00S	BEARING	HOLE Nº HDH-A-23
E 0+30W	INCL. Vertical	COLLAR ELEV. 6780
START COMPL.		DEPTH 235'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz	oz	% EQUIV.	GROUPING — RMKS.
0-170' Rhyolite tuff-porphoritic Rhyolite, buff to white, stringers and fracture fillings of FeOx												25
												50
												75
												100
												125

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT

Coörd. : N	BEARING	HOLE Nº
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
									0.10	1.02		
									0.02	2.17		
116'-220' Silicified dolomitic breccia. Blue-grey to grey. Massive to vuggy. Moderate amts of FeOx in subsidence fractures and soln channels. Bottom 20' appears more cherty less brecciated material.												
									0.06	4.29		
												150'
									0.04	3.25		
									0.06	3.59		
									0.02	3.13		175'
									0.07	4.64		
									0.09	2.00		
												200'
									0.06	1.56		
									0.05	1.32		
												225'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT

Coord. : N	BEARING	HOLE Nº
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
												150'
170'-175' Admixed Porph. Rhy and brecciated material									0.06	3.83		175'
175'-180' Transition zone of Quartzose brecciated material Very heavy FeOx in fracture fillings									0.30	4.29		
180'-223' Silicified dolmitic breccia, blue to blue grey massive to vuggy - moderate amts of FeOx.									0.25	1.75		200'
223'-225 altered limestone heavy amts. of MnOx - party argilized.									0.12	1.83		
									0.12	2.05		
									0.10	1.41		

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT Atlanta

Coörd. : N 0+25N	BEARING	HOLE Nº HDH-A-24
E 0+20W	INCL. Vertical	COLLAR ELEV.
START COMPL.		DEPTH 223'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz.	oz.	% EQUIV.	GROUPING — RMKS
0'-16' Porphoritic Rhyolite - Rhyolite tuff - Buff to white moderate to heavy amts of FeOx in fractures												25'
												50'
												75'
												100'
									0.03	0.34		
									0.05	0.46		
												125'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N 0+75N	BEARING	HOLE Nº HDH-A-25
E 0+50W	INCL. Vertical	COLLAR ELEV. 6783'
START COMPL.		DEPTH 240'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz	oz	% EQUIV.	GROUPING — RMKS.
0'-187' Porphoritic Rholite - Rhyolite Tuff, Buff to white stringers of FeOx - Heavy to moderate, felsitic ground mass higly altered - loosely consolidated.												25' 50' 75' 100' 125'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 2 of 2

PROJECT ATLANTA

Coörd. : N	BEARING	HOLE Nº
E	INCL.	COLLAR ELEV.
START COMPL.		DEPTH

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz.	Ag oz.	% EQUIV.	GROUPING — RMKS.
												150'
									Tr	0.12		175'
									0.01	0.58		
									0.01	1.24		
187'-205' Quartzose - Partially brecciated cherty transition zone white to light grey. Some banding - massive to broken light to moderate amounts of FeOx.												200'
									0.02	1.34		
205'-237' Silicified dolomitic breccia, light grey to blue grey massive to broken - moderate amts of FeOx.									0.06	0.87		
									0.06	1.50		225'
237'-240' Dolo/ls buffed, reasonably massive.												
									0.04	0.94		
												240'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N 4+45N	BEARING	HOLE Nº HDH-A-26
E 0+00	INCL. Vertical	COLLAR ELEV. 6846
START COMPL.		DEPTH 75'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0'-12' Porphoritic Rhyolrite buff-white (altered), felsitic groundmass, moderate amounts FeOx												
									0.08	1.58		
12'-20' Quartzose transition zone white to cherty, some banding evident, massive to broken												
									0.04	0.73		25'
									0.12	0.42		
									0.08	0.70		
												50'
20'-58' Silicified dolomite breccia, light grey to blue grey moderate amounts of FeOx									0.02	0.59		
									0.01	0.58		
												75'
58'-75' Dolomitic limestone Buff red - massive well consolidated, reacts with HCL only when powdered.												

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coörd. : N 2+45N	BEARING	HOLE Nº HDH-A-27
E 0+00	INCL. Vertical	COLLAR ELEV. 6835
START COMPL.		DEPTH 105'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV	GROUPING — RMKS.
0'-23' Porphoritic rhyolite - Rhyolitic tuff, buff to white, stringers and blebs of FeOx, Loosely consolidated												
23'-48' Silicified dolo. breccia light grey to blue grey, massive to broken, moderate amts of FeOx in subsidence fractures												25'
									TR	1.10		
									TR	0.24		
48'-73' Altered limestone dark colored - (MnOx stained?) massive, Reacts only upon being powdered												
									TR	0.35		
												50'
									TR	0.07		
									TR	0.07		
73'-105' Dolo/limestone brown - red - massive												
									TR	0.04		75'
									TR	0.04		
												105

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT Atlanta

Coord. : N 4+15S	BEARING	HOLE Nº HDH-A-28
E 0+68E	INCL. Vertical	COLLAR ELEV. 6772'
START COMPL.		DEPTH 90'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
Not logged												25
									0.01	0.68		40
									0.03	0.39		
												50
									0.08	0.63		
									0.24	0.75		
									0.38	0.66		
									0.20	0.66		

LOGGED BY _____ DATE _____

ATLANTA DRILLING

3 1/2 INCH, AIR TRAC (PERCUSSION D.H.)

ATDH NUMBER	COLLAR ELEVATION	LOCATION	ORE ZONE	SEC PLOT	TOTAL DEPTH	WEIGHTED ASSAY Au	Ag	COMMENTS
A-1	6752'	300s 090e	0-45'	300 South	45'	0.15	0.19	
A-2	6752'	332s 090e	0-35'	350 South	35'	0.20	0.38	no sample 25'-35'
A-3	6757'	350s 096e	15-35'	350 South	35'	0.12	0.35	
A-4	6760'	400s 110e		400 South	35'			lost air at 35'
A-5	6767'	450s 110e	35-45'	450 South	110'	0.15	0.10	
A-6	6754'	450s 040e	50-85'	450 South	60'			lost air at 60'
A-7	6753'	400s 036e	50-85'	400 South	85'	0.13	0.29	
A-8	6770'	350s 032e	45-60'	350 South	60'	0.09	0.49	lost air at 60'
A-9	6762'	240s 080e	15-60'	250 South	60'	0.25	0.44	lost air at 60'
A-10	6780'	200s 050e	15-35'	200 South	35'	0.33	0.34	lost air at 35'
A-11	6783'	150s 030e	30-70'	150 South	115'	0.19	0.47	
A-12	6785'	090s 015e	70-90'	100 South	90'	0.09	0.60	
A-14	6835'	150s 160e		150 South	50'			steel, su bit in h
A-15	6830'	200s 170e		200 South	65'			
A-16	6830'	250s 225e		250 South	70'			no sample 50-70' bit,sub l
A-17	6829'	300s 210e	0-20'	300 South	20'	0.09	0.18	
A-18	6827'	350s 180e	0-25'	350 South	25'	0.13	0.70	
A-20	6757'	285s 145e	0-30'	300 South	35'	0.15	0.14	lost air

Totals as of August 9, 1969:

Total no. of holes.....18
Total footage.....1,030 feet
Total ore zone influence.....395 feet

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA PROJECT

Coord. : N 3+32 SOUTH	BEARING	HOLE No. ATDH - A-2
E 0+90 EAST	INCL. VERTICAL	COLLAR ELEV. 6752
START COMPL.		DEPTH 35

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0-35 Silicified dolomite breccia light brown to grey; chips coated with FeO_x stain; massive to vuggy and broken									0.21	0.23		
									0.21	0.11		
									0.19	0.34		
									0.21	0.51		
									0.17	0.70		
									No Sample			25'
									No Sample			

LOGGED BY _____ DATE _____

ATDH - A-3

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coord. : N3+50 SOUTH	BEARING	HOLE Nº ATDH - A-3
E0+96 EAST	INCL. VERTICAL	COLLAR ELEV. 6757
START COMPL.		DEPTH 35

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	% Au	oz Ag	oz Ag	% EQUIV.	GROUPING — RMKS.
0 - 15 Brecciated quartz zone; light brown, massive; heavy amts. FeO_x Stain. Possibly silicified rhyolite porphery.								0.02	0.15			
								0.02	0.24			
								0.05	0.23			
15 - 35 Silicified dolomite breccia blue-grey, massive to tuggy and broken. Lessor amts. of FeO_x								0.12	0.19			
								0.12	0.36			25
								0.01	0.52			
								0.12	0.31			35

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 4=00 SOUTH	BEARING	HOLE Nº ATDH - A-4
E 1+10 EAST	INCL. VERTICAL	COLLAR ELEV. 6760
START COMPL.		DEPTH 35'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0-28' Porphoritic rhyolite; heavy FeO_x stain gives general light red appearance. Felsitic groundmass with quartz phenocrysts, possibly some orthoclase phenocrysts.									0.01	0.08		
									0.01	0.10		
									0.01	0007		
									0.01	0.09		
									0.02	0.18		
28'-35' Silicified dolomite breccia, blue-grey to light brown; heavy FeO_x stain.									0.03	0.19		
									0.06	0.15		
												35'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 4+50 SOUTH	BEARING	HOLE Nº ATDH - A-5
E 1+10 EAST	INCL. BEARING	COLLAR ELEV. 6767'
START COMPL.		DEPTH 110'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0-8.5' Rhyolite tuff; buff to white, knots of quartz and other brecciated material, disseminated amounts FeOx Stain.									0.01	0.05		
									0.01	0.05		
									0.01	0.07		
8.5'-28.5' Porphoritic rhyolite felsitic groundmass, phenocrysts of quartz, varying amounts of FeO_x pink to reddish cast.									0.01	0.06		
									0.02	0.07		
									0.02	0.05		25'
									0.04	0.09		
28.5 -36.5 Quartz zone; light brown to tan, disseminated amts. of brecciated material. Varying amounts of FeO_x									0.19	0.07		
									0.12	0.12		
36.5-56.0 Silicified Dolomite breccia; light grey to blue-grey very massive, some sec.calcite.									0.04	0.14		
									0.04	0.09		50'
56.0-71.0 Silicified Dolomite breccia, banded blue,black,red very massive, almost jasperoid appearance.									0.08	0.09		
									0.01	0.04		
									0.11	0.14		
71.0-110' Dolomitic limestone somewhate silicified, light brown to tanm,massive grading to a light grey at depth.									Tr	0.04		
									Tr	0.04		75'
									Tr	0.05		
									Tr	0.04		
									Tr	0.04		
									Tr	0.04		
									Tr	0.04		100'
									Tr	0.04		
												110'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 8+50 SOUTH	BEARING	HOLE No. ATDH - A-6
E ~~XXXXXXXXXX~~ 0+40 EAST	INCL. VERTICAL	COLLAR ELEV. 6752'
START COMPL.		DEPTH 60'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0-12' Rhyolite tuff, white to buff varying amounts of FeO_x									Tr	0.04		
									Tr	0.05		
12-50' Rhyolite tuff, grey to buff smaller amts of FeO_x, somewhate more consolidated than above zone									Tr	0.04		
									Tr	0.07		
									Tr	0.09		25'
									Tr	0.07		
									0.02	0.10		
									Tr	0.28		
									Tr0	0.47		
									Tr	0.52		50'
50-60' Admixed amounts of brecciated material and rhyolite porphery. very heavy FeO_x stain(close to hanging wall contact.									0.02	0.09		
									0.02	0.05		60'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ~~ATLANTA~~

Coord. : N ~~4+00 SOUTH~~	BEARING	HOLE Nº ATDH -A-7
E ~~0+36 EAST~~	INCL. ~~VERTICAL~~	COLLAR ELEV. 6753'
START COMPL.		DEPTH 85'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0 - 63' Rhyolite tuff, white to buff, varying amounts of FeO_x stain, occasional pebbles and cobbles of quartzitic material.									Tr	0.05		
									Tr	0.09		
									Tr	0.09		
									Tr	0.07		
									Tr	0.09		
									Tr	0.14		
									Tr	0.14		
									Tr	0.28		
									Tr	0.47		
									0.05	0.52		
47'-85' Silicified dolomitic breccia, light brown to grey-blue grey. Varying amounts of FeO_x stain, broken to massive and vuggy									0.22	0.47		
									0.07	0.30		
									0.06	0.33		
									0.04	0.31		
									0.34	0.31		
									0005	0.23		
									0.11	0.10		

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coord. : N 3+50 SOUTH	BEARING	HOLE No. ATDH - A-8
E 0+32 EAST	INCL. VERTICAL	COLLAR ELEV. 6770'
START COMPL.		DEPTH 60'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	Au oz	Ag oz	% EQUIV.	GROUPING — RMKS.
0-20' Brecciated zone, very little dolomitic texture remaining only small amounts (disseminated) FeO_x stain. Blue-grey color. Occasional amounts of Rhyolitic material.									0.06	1.97		
									0.06	1.65		
									0.05	1.19		
									0.05	1.60		
20'-26' Silicified dolomitic breccia light grey, heavy FeO_x Stain, broken									0.04	0.43		
									0.07	1.22		25'
26'-45' Silicified dolomitic breccia light grey to blue grey, lessor amounts of FeO_x, massive to broken									0.05	0.81		
									0.05	0.26		
									0.05	0.33		
									0.13	1.02		
									0.07	0.28		50'
45'-60' Silicified dolomitic breccia, light brown to tan varying amts. of FeO_x, massive to broken.									0.07	0.16		
												60'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 2+50 SOUTH	BEARING	HOLE No. ATDH - A-9
E 0+80 EAST	INCL. VERTICAL	COLLAR ELEV. 6762'
START COMPL.		DEPTH 60'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz. Au	oz. Ag	% EQUIV.	GROUPING — RMKS.
0' - 6' Admixed breccia and rhyolite tuff, some FeO_x stain.									0.09	0.13		
									0.06	0.30		
6' - 10' Quartz zone, very little brecciated material, some jasperoid like material; red, black and white-blue banded. Varying amts. of FeO_x.									0.09	0.36		
									0.21	0.44		
									0.26	0.67		
10' - 19' Silicified dolomite breccia, blue-grey, massive, limited amount of FeO_x.									0.13	0.45		25'
									0.39	0.61		
19' - 60' Silicified dolomite breccia, grey-tan, becoming more brown at 35'. massive, disseminated amounts of FeO_x. small amt. of sec. Carbonate.									0.37	0.42		
									0.31	0.45		
									0.24	0.40		
									0.15	0.26		50'
									0.16	0.32		
												60'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N2+00 SOUTH	BEARING	HOLE No. ATDH - A-10
E0+50 EAST	INCL. VERTICAL	COLLAR ELEV. 6780'
START COMPL.		DEPTH 35'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0' -13' Porphoritic rhyolite phenocrysts of quartz, Moderate FeO_x stain. Buff to brown with thin seams white									Tr	0.29		
									Tr	0.10		
									0.01	0.06		
13' - 22' Rhyolitic tuff, white to buff, moderate FeO_x stain, small amount of admixed brecciated material									0.08	0.23		
									0.10 0.09	0.49		
24' - 35' Silicified dolomitic breccia, med. grey, grading to light brown at bottom. Farily massive.									0.12	0.35		25'
									1.02	0.30		
												35'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 1+50 SOUTH	BEARING	HOLE Nº ATDH-A011
E 0+30 EAST	INCL. VERTICAL	COLLAR ELEV. 7833'
START COMPL.		DEPTH 115'

DESCRIPTION	Geol.	Alter.	INT.	C/R	%	%	%	%	oz. Au	oz. Ag	% EQUIV.	GROUPING — RMKS.
									Tr	0.15		
0' - 31' Rhyolite Tuff, Buff to white, varying amounts of FeO_x stain. loosely consolidated									Tr	0.01		
									Tr	0.02		
									Tr	0.02		
									0.01	0.02		
									0.01	0.02		25'
31' - 115' Silicified dolomite breccia, med. grey to blue grading to a buff around 50' and back to blue grey at 70'; massive to broken and vuggy.									0.09	1.19		
									0.15	0.77		
									0.22	1.42		
									0.16	0.70		
									0.17	0.35		50'
									0.43	0.78		
									0.19	0.29		
									0.09	0.25		
												75'
									0.03	0.55		
									0.03	0.78		
									0.05	4.12		
												100'
												115'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N0+90 SOUTH	BEARING	HOLE Nº ATDH-A-12
E0+15 EAST	INCL. VERTICAL	COLLAR ELEV. 6785'
START COMPL.		DEPTH 90'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
									0.01	0.17		
									Tr	0.19		
									Tr	0.09		
0' - 62' Porphoritic rhyolite, felsitic groundmass, phenocrysts of quarts, varying amounts of FeO_x stain throughout, Buff to white when not stained.									Tr	0.07		
									Tr	0.03		
									Tr	0.02		25'
									Tr	0.02		
									Tr	0.02		
									Tr	0.02		
									Tr	0.04		
									0.01	0.07		50'
									0.02	0.06		
62' - 90' Silicified dolomitic breccia, medium grey to blue, massive to broken, heavy FeO_x, disseminated amounts of sec. carbonate.									0.02	0.52		
								0.02	[illegible]	1.58		
								0.15	[illegible]	0.43		
								0.05	[illegible]	0.16		75'
								0.08		1.02		
								0.07		0.78		
												90'

LOGGED BY _____ DATE _____

ATDH - A-16

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coord. : N 2+50 SOUTH	BEARING	HOLE No. ATDH - A-16
E 2+25 East	INCL. VERTICAL	COLLAR ELEV. 6830'
START COMPL.		DEPTH 70'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0' - 60' Silicified dolomitic breccia, blue-grey to grey., massive to broken, moderate amts of FeO_x staining and sec. carbonate.									0.11	0.09		
									0.08	0.09		
												25'
												60'
												70'

LOGGED BY _____ DATE _____

ATDH - A-17

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ~~ATLANTA~~

Coord. : N ~~3+00 SOUTH~~	BEARING	HOLE Nº ~~ATDH - A-17~~
E ~~2+10 EAST~~	INCL. ~~VERTICAL~~	COLLAR ELEV. ~~6829'~~
START COMPL.		DEPTH 20'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0' - 20' Silicified dolomite breccia, blue-grey to grey, massive to broken, moderate amts. FeO_x stain									0.13	0.19		
									0.04	0.19		
									0.07	0.17		
									0.12	0.19		
												20'

LOGGED BY _____ DATE _____

ASSAY—GEOLOGY COMPOSITE DRILL LOG

PROJECT ATLANTA

Coord. : N 3+50 SOUTH E 1+80 EAST	BEARING INCL. VERTICAL	HOLE No. ATDH - A-18 COLLAR ELEV. 6327'
START COMPL.		DEPTH 25'

DESCRIPTION	Geol.	Alt.	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV.	GROUPING — RMKS.
0' - 25' Silicified dolomitic brecoia, med grey to blue. moderate amts. of FeO_x Broken and vuggy									0.18	2.12		
									0.10	0.35		
									0.06	0.26		
									0.19	0.35		
									0.10	0.33		
												25'

LOGGED BY _____ DATE _____

ATDH - A-20

ASSAY—GEOLOGY COMPOSITE DRILL LOG

Sheet 1 of 1

PROJECT ATLANTA

Coord. : N 2+65 SOUTH	BEARING	HOLE No ATDH & A-20
E 1+65 East	INCL. VERTICAL	COLLAR ELEV. 6757'
START COMPL.		DEPTH 35'

DESCRIPTION	Geol.	Assay	INT.	C/R	%	%	%	%	oz Au	oz Ag	% EQUIV	GROUPING — RMKS.
0' - 35' Silicified dolomite breccia.med. grey to blue, massive to broken. moderate amounts of FeO_x.									0.16	0.23		
									0.14	0.12		
									00.15	0.12		
									0.18	0.09		
									0.11	0.12		
									0.16	0.17		
									no sample			30'
									no sample			

LOGGED BY _____ DATE _____

MINING METHOD

The mining scheme should be conventional open pit, using air tracs for drilling, ANFO for blasting and front end loader for loading and hauling.

STRIPPING RATIOS

Due to the unusually close concordance between the breccia zone and the surface, the ratio of waste to mineralized breccia increases slowly with progress down the dip. The ratio is shown on the cross sections as the inclined height of the 55 degree stripping wall relative to the width of rich breccia made accessible for mining. The stripping ratio for reserves to the depth calculated ranges from 0: 1 to 5.6: 1 yard of waste per yard of rich breccia, and averages 1.86:1.

ORE AND WASTE FOR EACH BENCH

ORE BENCH	BENCH TONNAGE	ORE TONNAGE CUMUL-ATIVE	WASTE TONNAGE	WASTE TONNAGE CUMUL-ATIVE	WASTE TO ORE RATIO	WASTE TO ORE RATIO CUMUL-ATIVE
6870	11,200	11,200	100	100	-	-
6850	27,300	38,500	150	250	-	-
6830	29,200	67,700	1,600	1,850	-	-
6810	32,700	105,400	6,000	7,850	0.20	0.07
6790	49,800	155,200	13,400	21,250	0.27	0.14
6770	73,500	228,700	24,900	46,150	0.34	0.20
6750	88,900	317,600	44,800	90,950	0.50	0.29
6730	103,400	421,200	138,800	229,750	1.35	0.54
6710	106,600	527,600	165,200	394,950	1.56	0.75
6690	104,700	632,300	167,300	562,250	1.61	0.89
6670	103,600	735,900	270,700	832,950	2.62	1.13
6650	116,000	851,900	298,600	1,131,550	2.57	1.33
6630	109,200	961,100	158,700	1,290,250	1.46	1.34
6610	81,200	1,042,300	324,200	1,614,450	4.00	1.55
6590	58,000	1,100,300	193,500	1,807,950	3.33	1.64
6570	45,400	1,145,700	205,700	2,013,650	4.56	1.76
6550	34,000	1,179,700	186,000	2,199,650	5.47	1.86

ADDITIONAL MINERAL POTENTIAL

Additional tonnages of comparable value should be discovered along strike to the north of the Atlanta Mine and below the 200 level. Systematic sampling and exploration of the Bradshaw Mine breccia zone is certain to develop an additional source of mineralized breccia comparable or superior to the Atlanta Mine reserves in quality. Widespread zones of silicification in all parts of the property hold promise for geochemical investigation and drill exploration.

One drill hole 400' N. on the strike of the present orebody intercepted 40' of ore. This was not considered in the ore calculations. It indicates that there is a very good possibility of developing additional ore in the immediate area.

LEACHING POTENTIAL

There has been much written recently in regard to handling once marginal gold-silver deposits with adequate tonnage through various types of leaching procedures. The proven nature of the Atlanta deposit led us to conduct preliminary column cyanide leach tests which at this point indicate that a very definite economic advantage can be gained through heap leaching.

The following two papers illustrate the possibilities of leaching at Atlanta.

EXPERIMENTAL LEACHING OF GOLD FROM MINE WASTE

By H. J. Heinen and Bernard Porter

* * * * * * * * * * * report of investigations 7250

UNITED STATES DEPARTMENT OF THE INTERIOR
Walter J. Hickel, Secretary

BUREAU OF MINES
John F. O'Leary, Director

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EXPERIMENTAL LEACHING OF GOLD FROM MINE WASTE

by

H. J. Heinen[1] and Bernard Porter[2]

ABSTRACT

Excellent gold recovery was demonstrated in a laboratory-scale leaching test on waste material from an open-pit mine in northeastern Nevada. An injection system of leaching was applied in which the sodium cyanide solution was introduced into the interior of the dump at selected points. Dissolution of gold from the waste material, which assayed 0.06 ounce gold per ton, was readily achieved because the gold occurred as submicroscopic particles in a porous host rock. Gold recovery of 80 percent was obtained in 11 days from material crushed to 1 inch in size, and recovery was 90 percent after 21 days.

INTRODUCTION

In recent years, the domestic consumption of gold for industrial purposes, such as the manufacture of electronic equipment, has increased markedly. This growing demand for gold has encouraged efforts to develop low-grade ores and submarginal materials. One phase of the Bureau of Mines Heavy Metals Program is directed toward the investigation of processes for recovering gold from such sources. This paper is concerned with a preliminary effort to evaluate dump leaching as a potential method for recovering gold from low-grade sources.

Several significant gold deposits occur over an extended area in northeastern Nevada (3).[3] Most of these ore bodies could be or are being mined by normal open-pit methods. In practice, material sent to the dump contains less than 0.05 to 0.08 ounce gold per ton, depending on the mine cutoff figure. Mining engineers estimate that about 10 million tons of low-grade ore and mine waste from past and present operations contain 0.05 to 0.13 ounce gold per ton. In addition, other deposits of relatively high-grade oxide ore are too small for commercial exploitation using the conventional countercurrent decantation cyanide process. However, it may be economically feasible to treat both types of material by dump-leaching techniques to recover the gold.

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[3]Underlined numbers in parentheses refer to items in the list of references at the end of this report.

Dump leaching of low-grade ores or mine wastes is widely used in the copper industry (2, 4-6) and more recently has been applied to uranium ores. Advantages are the low capital cost and the relatively low operating cost. In dump leaching mine waste material piled in dumps on prepared pads is treated with a leach solution introduced either on top of or inside the dump to extract values. For a successful operation the rock must be fractured or of high porosity to insure thorough contact between the mine waste and the leach solution. In addition, intermittent partial drying of the dump is necessary.

Mine waste material from northeastern Nevada was used in this study. The gold occurs as submicroscopic particles in a porous sedimentary rock, which is chiefly siltstone and limey shale and contains large amounts of clay.

APPARATUS AND PROCEDURE

Small-scale percolation leaching tests on 1-inch-size rock gave encouraging results. Essentially all the gold was recovered from the rock, which assayed approximately 0.06 ounce gold per ton. The resultant tails from these tests contained ~0.005 ounce gold per ton.

Consequently, a test was conducted on an expanded scale in a 27-inch-high plastic barrel with a 13.5-inch ID. Centrally located in this barrel was a 27-inch-long, 1.5-inch-diameter plastic pipe, which was closed at the lower end. The pipe was perforated with holes (0.25 inch in diameter) spaced 90° apart around its periphery and at 4-inch intervals along its length. Provision was made at the bottom of the barrel for draining and collecting the leach solutions. The barrel held approximately 200 pounds of mine waste crushed to 1-inch size. The leachant for extraction contained 2 pounds of sodium cyanide per ton of solution. Lime for protective alkalinity was not added since the water and rock formed a pulp with a pH of 8. The quantity of solution was 400 pounds per ton of waste rock.

The injection system (1) of leaching was selected because it minimized the mechanical difficulties often encountered in leaching clay-bearing materials. The solution was fed into the inner perforated pipe at a controlled rate to first wet the lower portions of the charge. Gradual permeation of the leach solution into the upper portion of the charge occurred through capillary action. Leaching took place as the solution percolated down to the bottom of the barrel where it was collected and then fed back into the top of the plastic pipe. The solution was recycled several times throughout an 8-hour test period. The system was allowed to drain overnight, and during this time the charge was partially dried and aerated. The gold was stripped from the leach solution each morning by use of activated carbon. The gold-laden carbon was collected by filtration, and the barren solution was then recycled for another 8 hours. The carbon was ashed and fire assayed for gold content.

Each day, prior to beginning the extraction, the inner pipe was filled with sufficient mine waste to raise the level 2 inches. This blocked the lowest set of holes every second day and forced the leach solution into the bed at the next higher set of holes. After 12 days the material in the pipe approached the top set of holes. The leaching test was continued with the top

percent of the gold lost in the tailings was soluble gold not washed out of the waste material.

TABLE 2. - Gold distribution in the cyanide tailings

Screen size	Size distribution		Gold assay, oz/ton	Gold distribution, percent
	Weight-percent	Cumulative, weight-percent		
Plus 1/2 inch.....	19.4	19.4	0.007	24.2
Minus 1/2 inch plus 1/4 inch	20.0	39.4	.006	20.7
Minus 1/4 inch plus 10 mesh.	17.5	56.9	.005	15.5
Minus 10 plus 100 mesh.....	15.4	72.3	.004	10.3
Minus 100 mesh.....	27.7	100.0	.002	10.3
Composite.....	100.0	100.0	.0047	81.0
H_2O-soluble gold.....	-	-	.0011	19.0
Total tails.....	100.0	100.0	.0058	100.0

The reagent consumption was 0.4 pound NaCN per ton of mine waste. Part of this consumption was due to adsorption of NaCN by the activated carbon. The final strip solution had <0.002 pound NaCN per ton of solution.

CONCLUSIONS

The results of the test show that the injection system of leaching is potentially feasible for large-scale use in the extraction of gold from mine wastes and submarginal oxide ores. The efficiency of the method was demonstrated by the 80-percent gold recovery in 10 days and a total gold recovery of 90 percent in the 21-day test period. Reagent consumption was 0.4 pound of NaCN per ton of mine waste treated. The results suggest larger scale tests and tests on other low-grade materials.

set of holes uncovered. At no time was the leachant poured directly onto the top of the bed.

The total leaching period was 21 days. To compensate for liquid lost by evaporation, tapwater was periodically added to the barren solution. At the end of the test, the residue was removed from the barrel, dried, and sampled for analysis by fire assay and atomic absorption methods.

RESULTS

Gold recoveries are shown in table 1. At the end of 5 days, 64 percent of the total gold had been recovered; after 10 days, the recovery was 80 percent. In the remaining 11 days, an additional 10 percent of the gold was extracted for a total recovery of 90 percent. The resulting tails assayed 0.006 ounce gold per ton.

TABLE 1. - Metallurgical balance for leaching test

Description of product	Gold, milligrams	Gold distribution	
		Percent	Cumulative, percent
Strip No.:			
1	38.92	20.69	20.69
2	30.25	16.08	36.77
3	23.45	12.47	49.24
4	16.91	8.99	58.23
5	10.58	5.62	63.85
6	7.13	3.79	67.64
7	7.62	4.05	71.69
8	6.56	3.49	75.18
9	5.28	2.81	77.99
10	4.26	2.26	80.25
11	3.50	1.86	82.11
12	2.28	1.21	83.32
13	2.07	1.10	84.42
14	2.20	1.17	85.59
15	1.45	.77	86.36
16	1.20	.64	87.00
17	1.07	.57	87.57
18	1.08	.57	88.14
19	2.76	1.47	89.61
20	.83	.44	90.05
21	.68	.36	90.41
Total recovery	170.08	90.41	90.41
Cyanide tails	18.04	9.59	100.0
Composite	[1]188.12	100.0	100.0

[1]Equivalent to 0.06 oz gold/ton.

Table 2 shows the distribution of gold in the cyanide tailings as obtained by wet screen analyses. As expected, the coarser fraction (plus 1/2-inch) retained the largest portion of the undissolved gold. About 19

REFERENCES

1. Ballard, James K. Methods of Application of Leach Dump Solution at Anaconda's Butte Operation. Soc. Min. Eng. of AIME, Preprint No. 68-AS-312, 1968, 4 pp.

2. Bhappu, Roshan B., P. H. Johnson, J. A. Brierley, and D. H. Reynolds. Theoretical and Practical Studies of Dump Leaching. Soc. Min. Eng. of AIME, Preprint No. 68-AS-342, 1968, 35 pp.

3. Merwin, Roland W. Gold Resources in the Oxidized Ores and Carbonaceous Material in the Sedimentary Beds of Northeastern Nevada. BuMines Tech. Prog. Rept. 1, March 1968, 16 pp.

4. Sheffer, Herman W., and LaMar G. Evans. Copper Leaching Practices in the Western United States. BuMines Inf. Circ. 8341, 1968, 57 pp.

5. Shoemaker, R. S. Economics of Heap Leaching. Soc. Min. Eng. of AIME, Preprint No. 68-AS-301, 1968, 11 pp.

6. Woodcock, J. T. Copper Waste Dump Leaching. Proc. Australian Inst. Min. and Met., No. 224, December 1967, pp. 47-66.

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RECOVERING GOLD FROM STRIPPING WASTE AND ORE BY PERCOLATION CYANIDE LEACHING

by

George M. Potter

Bureau of Mines Metallurgy Research Program

Technical Progress Report - 20

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U.S. DEPARTMENT OF THE INTERIOR

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RECOVERING GOLD FROM STRIPPING WASTE AND ORE BY PERCOLATION CYANIDE LEACHING

by

George M. Potter[1]

ABSTRACT

Simple and low-cost heap and vat percolation cyanide leaching methods were applied on a laboratory scale for recovering gold from submarginal mine strip material and from ores representative of deposits with limited reserves not justifying construction of a conventional cyanide treatment plant. Gold-bearing material, as coarse as 4 inches in size and assaying from 0.06 to 0.6 troy ounce per ton, was leached successfully with dilute cyanide-lime solutions. From 66 to 95 percent of the gold in the samples was dissolved and recovered in activated carbon. The amenable ores and materials invariably contained micron-size gold distributed throughout a porous, relatively cyanicide-free gangue.

INTRODUCTION

Gold-bearing rock can be effectively processed by heap or vat cyanide leaching techniques, provided the rock is competent, porous, and relatively free of cyanicides, and that the gold occurs as fine-sized clean particles. In heap leaching, run-of-mine or crushed rock is piled on an impervious base. The dilute cyanide-lime solution is distributed over the surface of the heap, collected, and recycled for weeks or months, depending on the depth and permeability of the heap and the size and permeability of the rock. In vat leaching, finely crushed or deslimed ground ore is carefully bedded in vats to assure permeability. Leaching is done by repeated upward or downward flooding with cyanide solution and draining the vat, or by intermittent downward percolation of cyanide solution. Several days to a week or more of leaching may be required. In either system, the low-strength pregnant solution may be treated continuously or intermittently with activated carbon to recover the gold.

In this research, conducted by the Bureau of Mines as part of a program to develop new domestic sources of gold, heap leaching practice was simulated by percolating cyanide solution through a loosely packed column of coarse ore with free draining of solution and by sprinkling solution on a heap of ore placed on a flat, slightly inclined impervious base. Vat leaching practice

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was simulated using a column of ore but employing downward flood leaching conditions. Activated carbon was used to remove gold from pregnant leach solutions continuously, except in comparative tests wherein solutions were recycled without gold removal.

TREATMENT OF LOW-GRADE STRIP WASTE

With the cooperation of a Nevada producing mine, several samples of low-grade mine strip waste were obtained for testing. Mineralogically the strip waste is composed of fine-grained, silicified limestone cut by numerous fractures filled with streaks of limonite and veinlets of calcite. The test lots obtained assayed 0.02 to 0.08 ounce of gold per ton. The gold occurs as fine particles, mostly minus 1 micron in size, accessible to cyanide leach solutions along fracture planes and through permeable rock.

We made column leaching tests on four stripping waste samples to simulate freely draining heap or vat percolation. The solution was slowly distributed on the surface of the ore and allowed to drain downward through the column. Pregnant gold solution was continuously stripped of its gold content by passing it through a bed of activated carbon before adjusting the cyanide and lime strength and returning the solution to the leaching cycle. Minus 1-inch ore in a loosely packed, 2-foot-high column was leached 6 to 7 days with solution containing 0.1 percent sodium cyanide and 0.01 percent calcium oxide. The results are given in table 1.

TABLE 1. - Column leaching of strip waste

Sample	Gold assay, oz/ton		Gold recovery, pct	Leaching time, hours	Reagent consumption, lb/ton	
	Head	Tail			NaCN	CaO
1	0.068	0.015	86	144	0.4	0.5
2	.022	.002	91	144	.5	.3
3	.047	.007	85	144	.4	.5
4	.085	.023	73	160	.7	3.5

The test results in table 1 show that from 73 to 91 percent of the gold was recovered. Reagent consumption was 0.4 to 0.7 pound of NaCN and 0.3 to 3.5 pounds of CaO per ton of ore treated.

To confirm the results of the column leach test, we leached a heap prepared from a composite sample of the four lots of strip waste. Strip waste crushed to 1-1/4 inches and mixed with about 4 pounds of calcium hydroxide per ton was placed in a heap 35 inches in diameter and 14 inches deep, with an 8-inch-diameter flat top. The heap, containing 340 pounds of ore, was percolated with a solution of 0.1 percent NaCN and 0.01 percent CaO at the rate of 100 ml per minute, sprinkled from a rotating distributor pipe. This is equivalent to 6 gallons per square foot per day, or 1 ton of solution per ton of ore per day. During the 510-hour leaching period, gold was continuously stripped from pregnant solution with activated carbon. Gold recovery was 76 percent from the 0.08-ounce composite head, leaving a tailing assaying 0.02 ounce.

TREATMENT OF GOLD ORES

Because heap and vat leaching require relatively low capital investment, we investigated the applicability of these methods to a variety of ores from deposits with insufficient reserves to warrant building a conventional cyanide plant. The results of testing a suite of samples from a small gold deposit in north-central Nevada are typical.

The four test samples contained 0.09 to 0.6 ounce of gold per ton of ore. The gold occurred as finely divided clean particles smaller than 1 micron, widely distributed throughout breccia composed of altered flow rock fragments cemented with silica and iron oxides. The ore is highly fractured and porous.

Samples of minus 1/2- to minus 4-inch ore, as received, were packed loosely in glass columns, 2 to 6 inches in diameter and 2 to 4 feet tall. Cyanide solution containing 0.1 percent NaCN and CaO was slowly added to the columns and allowed to trickle freely downward through the ore. The pregnant solution was continuously stripped of gold by passage through a small column of activated carbon, and the stripped solution was then adjusted to original cyanide and lime concentration before recycle to the columns. Table 2 gives the results of these tests.

TABLE 2. - Simulated heap leaching, gold ores

Sample	Ore size, inches	Gold assay, oz/ton		Gold recovery, pct	Leaching time, hours	Reagent consumption, lb/ton	
		Head	Tail			NaCN	CaO
1	1/2	0.63	0.03	95	48	0.7	2.7
2	4	.25	.04	83	1,000	1.0	4.9
3	2	.20	.03	84	864	1.0	4.3
4	2	.09	.03	67	552	1.0	5.6

As indicated in table 2, the different grades and sizes of ore are amenable to heap leaching with dilute cyanide solutions. Gold recoveries in laboratory tests were 67, 83, and 95 percent for the lowest, medium, and highest grade ores, respectively. The required leach time ranged from 48 hours for minus 1/2-inch ore to 1,000 hours for the minus 4-inch ore. Reagent consumptions ranged from 2/3 to 1 pound of NaCN and 2.7 to 5.6 pounds of CaO per ton of ore.

RESEARCH ON PROCESS VARIABLES

Our current research is focused on identifying and defining the key process variables that influence the rate and completeness of the dissolution of gold. These studies are incomplete; hence, we can offer only a few generalizations about the results obtained to date on the several suites of ores and strip wastes we have tested.

By comparable testing, we have established that effective leaching with minimum consumption of cyanide and lime is attained by controlling the pH near

10.5 and maintaining the cyanide concentration near 0.1 percent. Stronger cyanide solution and lower pH both lead to higher cyanide consumption but do speed gold dissolution.

Cyanide solution flow rate has little influence on gold leach rate. Comparable extractions in the same time were obtained with solution flow rate ranging between 20 and 775 gallons per square foot of area per 24 hours. Similarly we have successfully leached columns of ore from 2 to 12 feet high with no notable difference in the rate or completeness of extraction. Analysis of the effluent solution revealed that passage of the leach solution, through up to 12 feet of ore, does not significantly deplete the dissolved oxygen content.

Parallel tests established that use of activated carbon to strip gold from solution before the solution is recycled to columns or heaps of ore enables faster, but not necessarily more complete, gold dissolution. In the laboratory, activated carbon proved superior to zinc dust for recovering the gold from the lower tenor pregnant solution obtained by column and heap leaching of low-grade ores and strip wastes.

We have completed only empirical tests on the relationship of ore size and grade to leach rate and gold extraction. In the ores and strip waste tested, the percent of gold extracted is related to the grade, and the leach rate is apparently governed by the size and the solution permeability of the material being leached.

Notably, even after prolonged leaching of material containing 0.06 to 0.6 ounce of gold per ton, the residue still contained 0.002 to 0.03 ounce of gold per ton. Table 3 gives a typical screen analysis of the residue from leaching minus 4-inch ores assaying 0.2 and 0.09 ounce of gold per ton for 860 hours and 550 hours, respectively.

TABLE 3. - Screen analysis of typical leach residue

Size	Ore A (860-hr leach)		Ore B (550-hr leach)	
	Weight-percent	Au, oz/ton	Weight-percent	Au, oz/ton
Plus 1 inch.....	35.0	0.05	42.4	0.05
Plus 10 mesh.....	41.3	.02	41.4	.02
Minus 10 mesh.....	23.7	.02	16.2	.01
Total and average...	100.0	.03	100.0	.03
Ore.....	-	.20	-	.09

FIELD TEST

The success achieved in laboratory heap leaching of mine strip waste from a Nevada gold producer encouraged the company to initiate larger scale field testing using conditions similar to those employed in the laboratory. About 500 tons of as-mined strip waste (minus 3 feet in size) was piled on a specially prepared sloping pad lined with impervious plastic. Leach solutions containing 0.1 percent NaCN and 0.09 percent CaO and maintained at pH 10 to 11

were sprinkled over the 4-foot-high heap at a rate of 30 gallons per square foot per day. Pregnant solution was collected in several sumps and pumped through small columns of activated carbon to remove dissolved gold. The lime and cyanide contents of the stripped solution were adjusted to original strength, and the solution was then recycled.

After 35 days of leaching, about 53 percent of the gold had been recovered from the heap of strip waste containing a calculated 0.075 ounce of gold per ton. Cyanide consumption was about 1.1 pounds of NaCN per ton of waste leached. Gold was still being extracted at a measurable rate when the test was terminated. Encouraged by the results of the first large-scale field test, the company is continuing its test program and is currently experimentally leaching two additional test heaps of strip waste to better define the process and improve the results.

SUMMARY

Laboratory tests show that cyanide leaching at coarse size of oxidized permeable ores and stripping wastes containing fine gold recovered 67 to 95 percent of the gold. About 1 week to 6 weeks of leaching was required. Reagent requirements were modest. In an initial field test on coarser stripping waste than used in laboratory work, gold dissolution was slower and lower than obtained in the laboratory. About 53 percent of the gold was extracted from material at a maximum size of 2 to 3 feet. The field test work is being continued.

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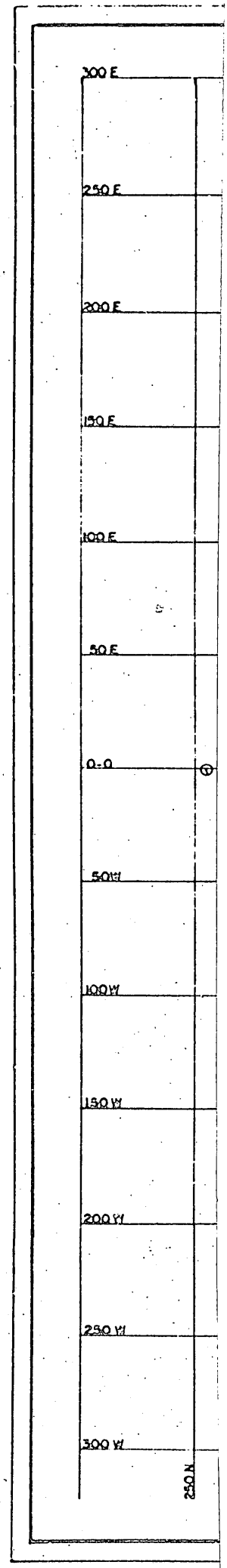
REFERENCES

1)	Collins, Clyde	Numerous Reports
2)	Frost, J. F.	Reports for Duval (1967)
3)	Hill, James M.	USGS Bulletin 64B (1916)
4)	Joralemon, P. J.	Samplings and report for Camp Bird. 19
5)	Longyear, E. J.	Channel Sampling Report (1930)
6)	Nelson, H. E.	Reports for A & B Gold-Silver Mines (1966)
7)	Smith, L. E.	Detailed Summation of All Information from Atlanta (1968)

PLATE IV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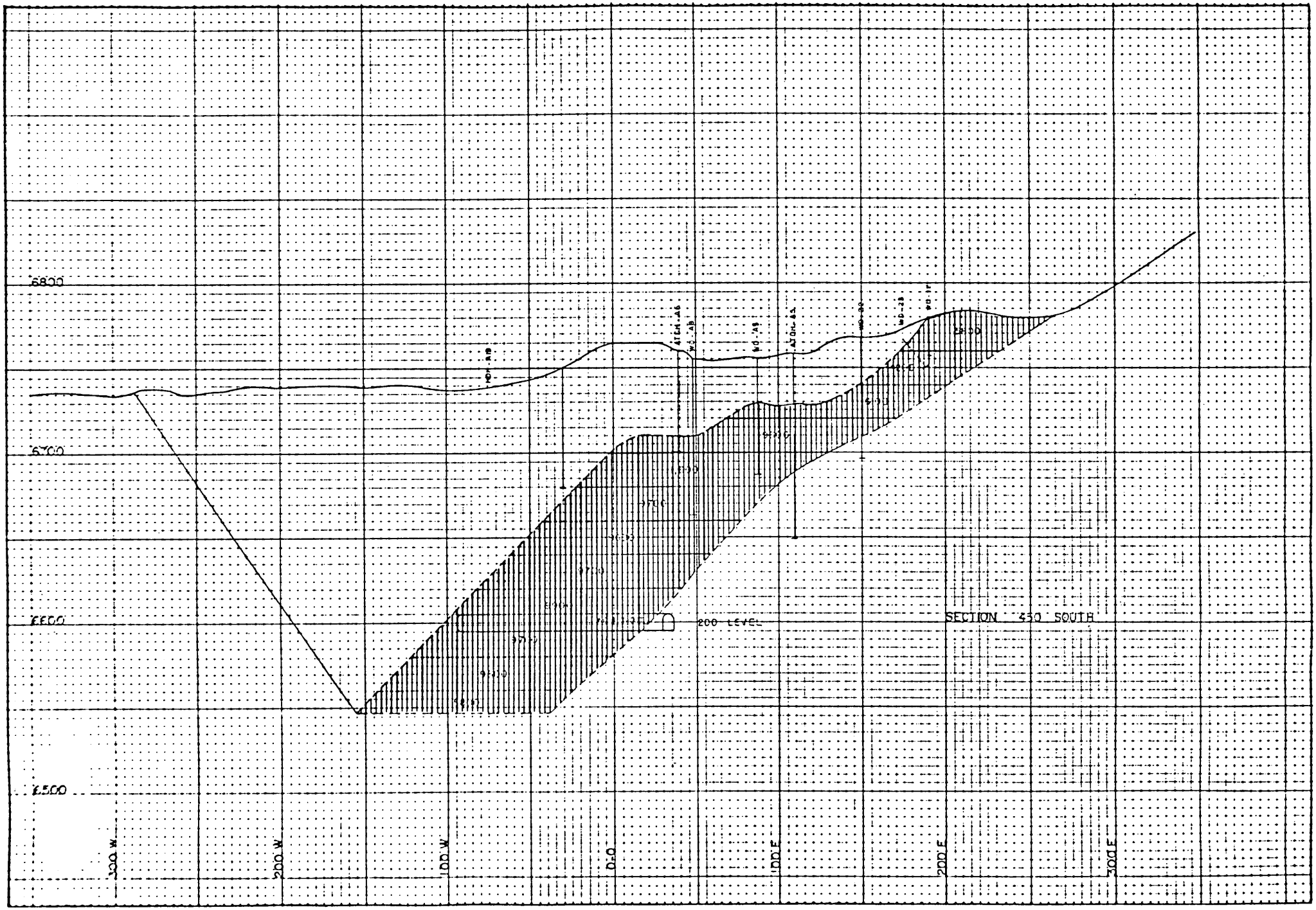
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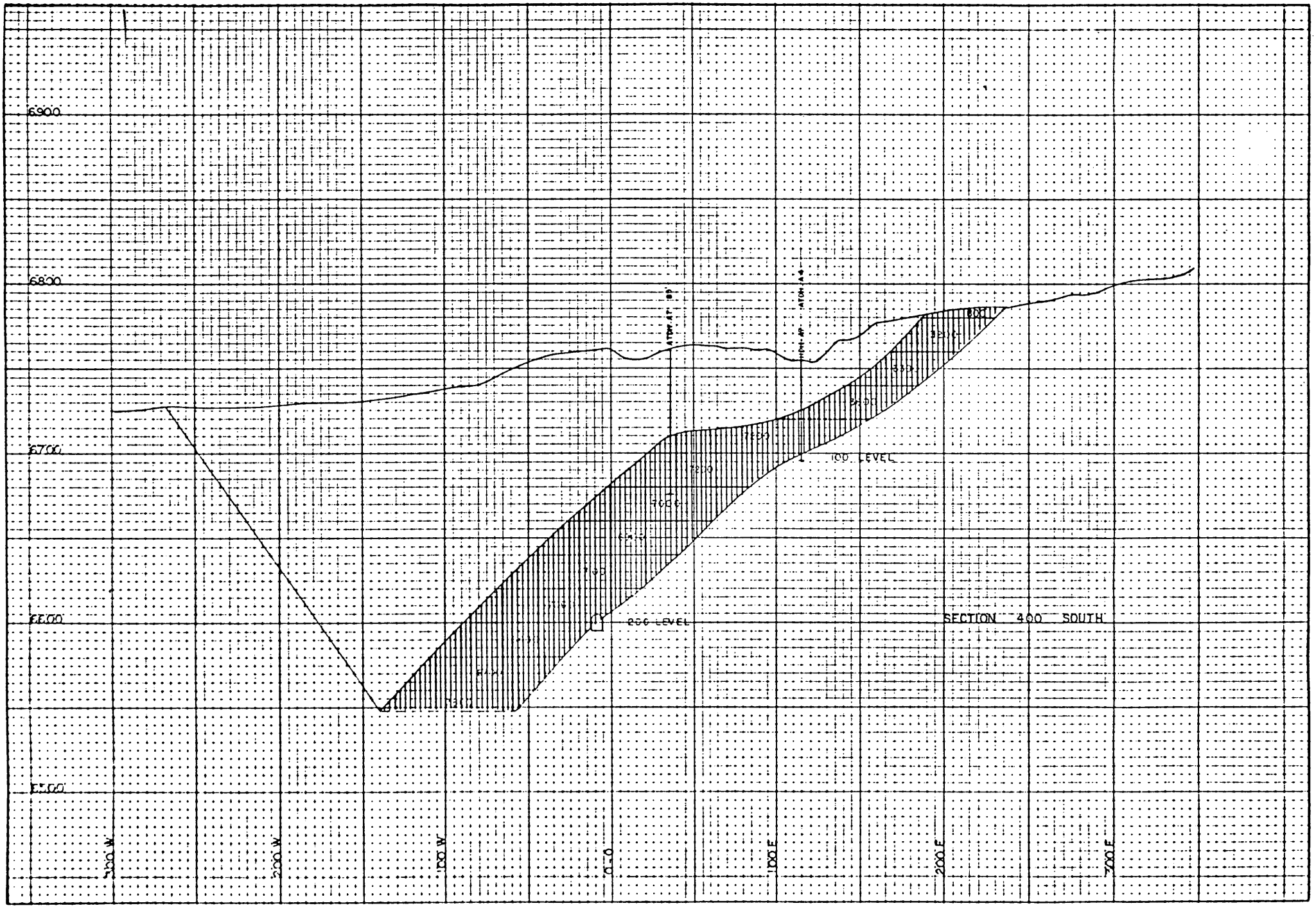
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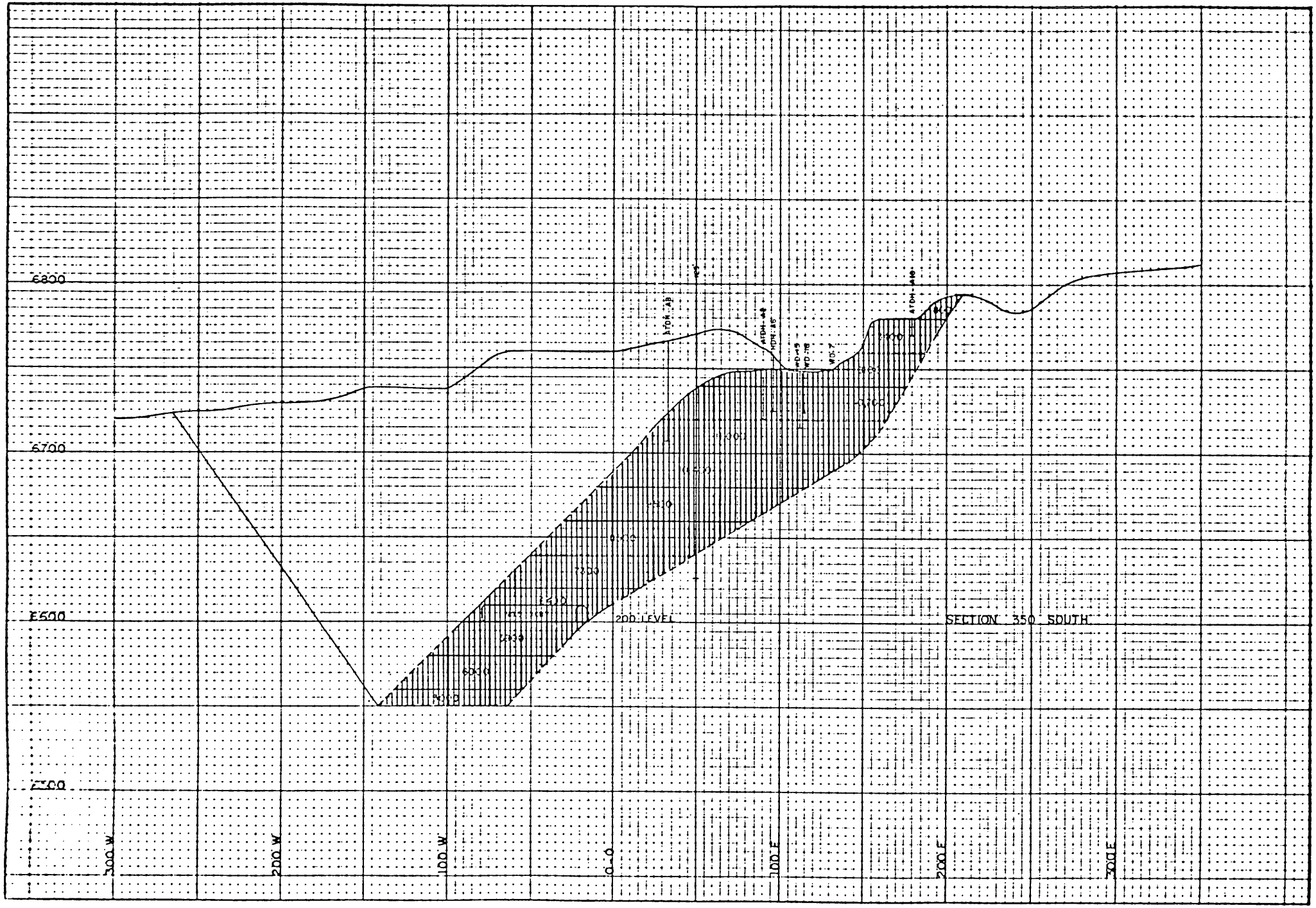
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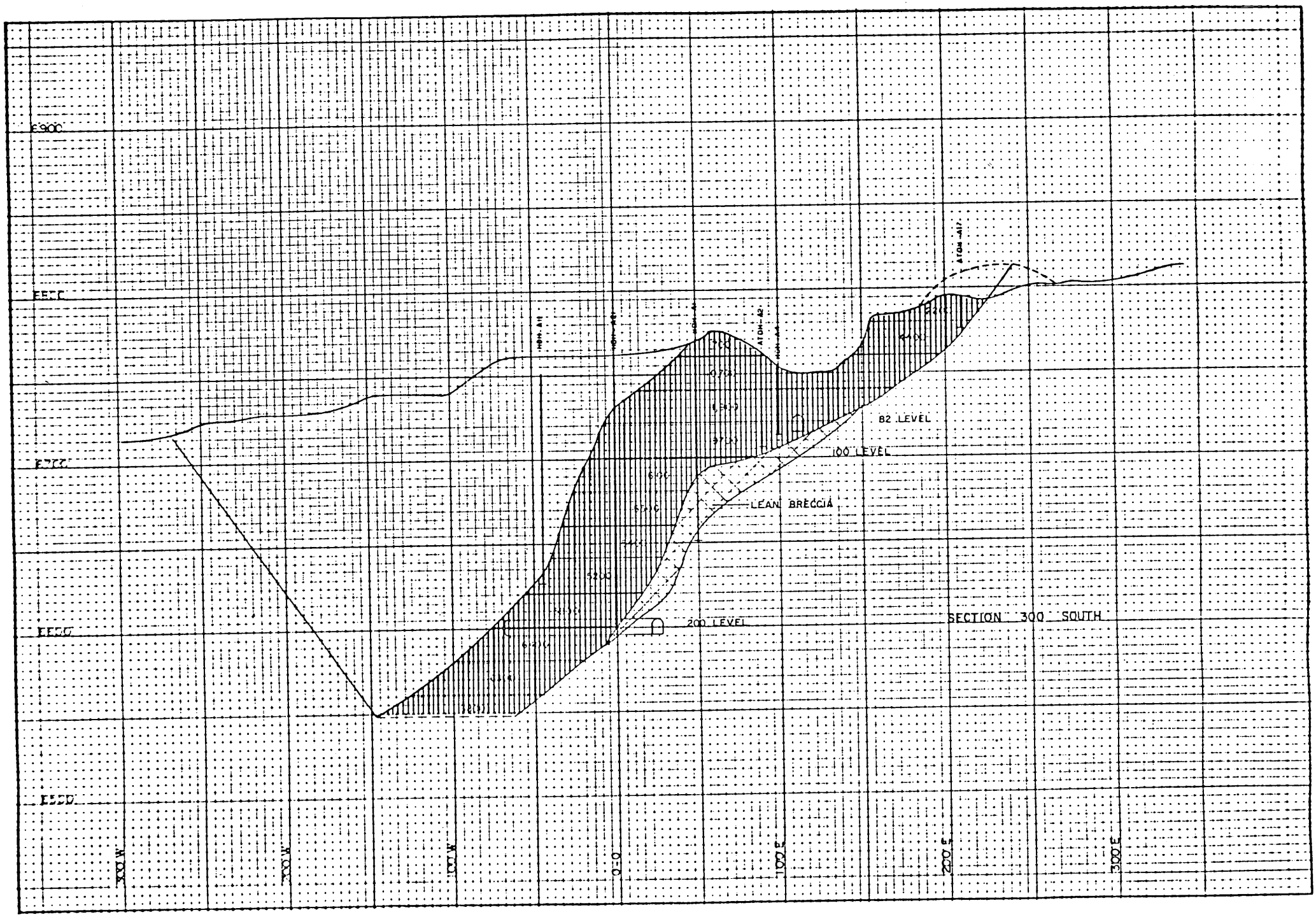
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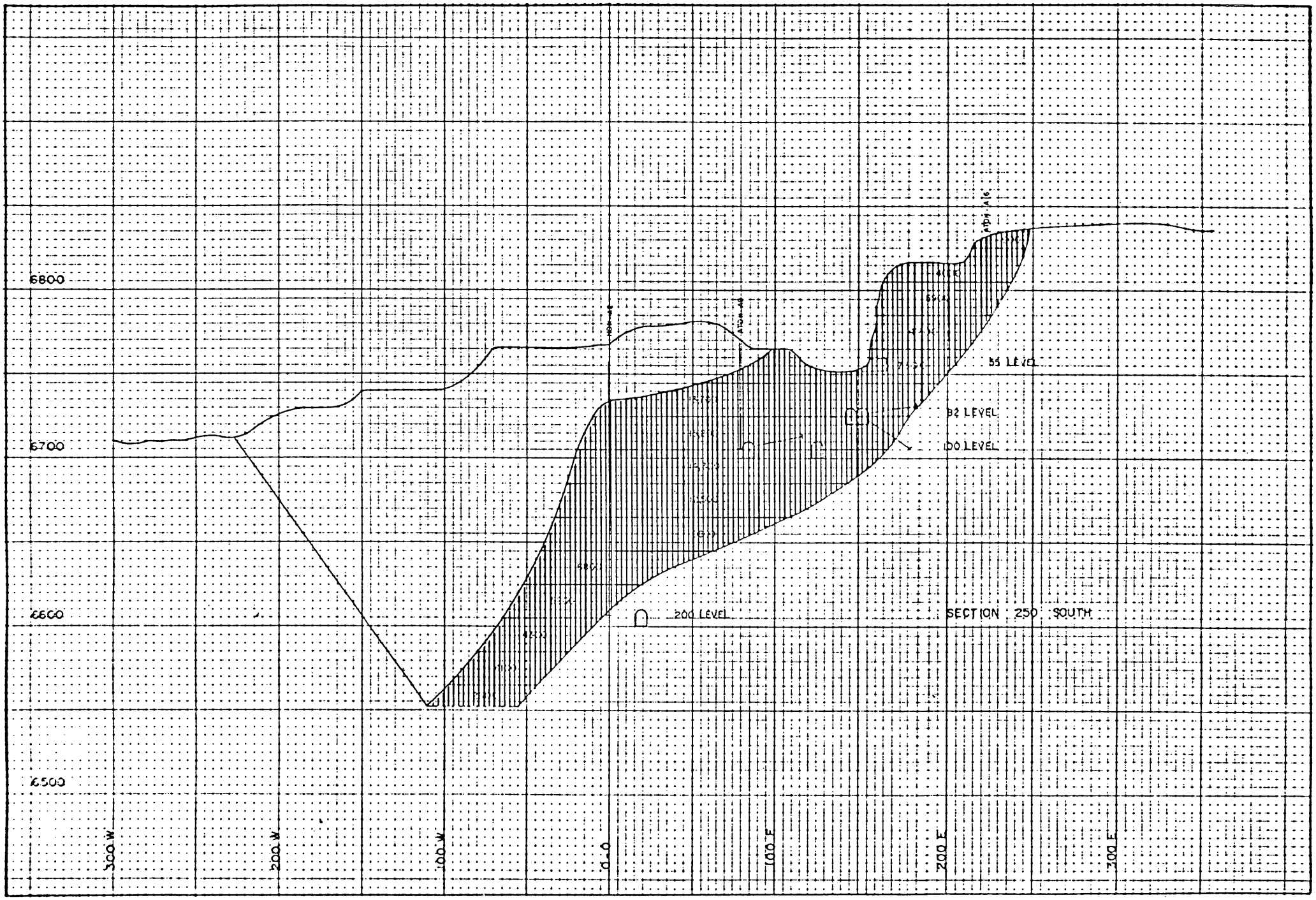
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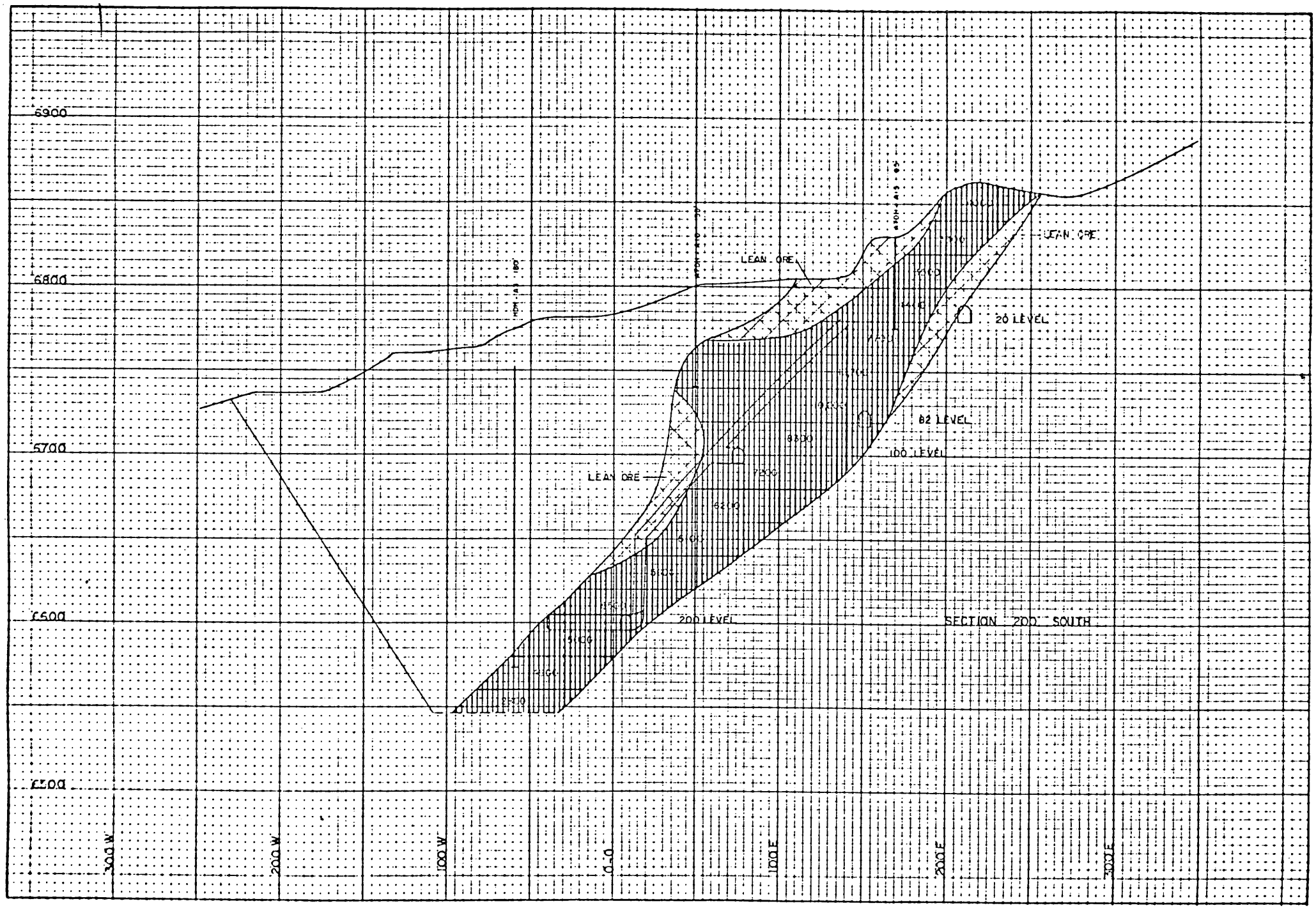
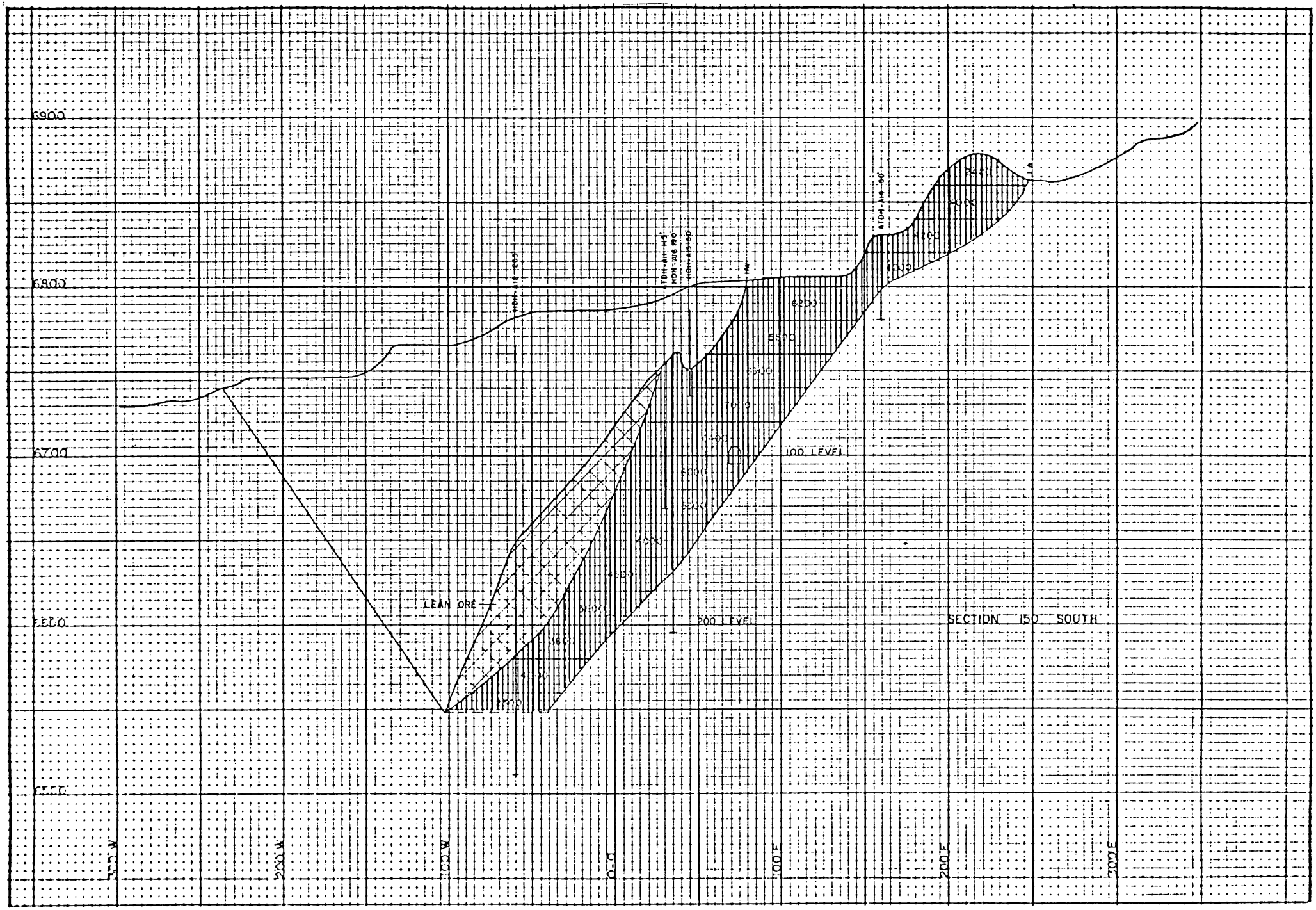
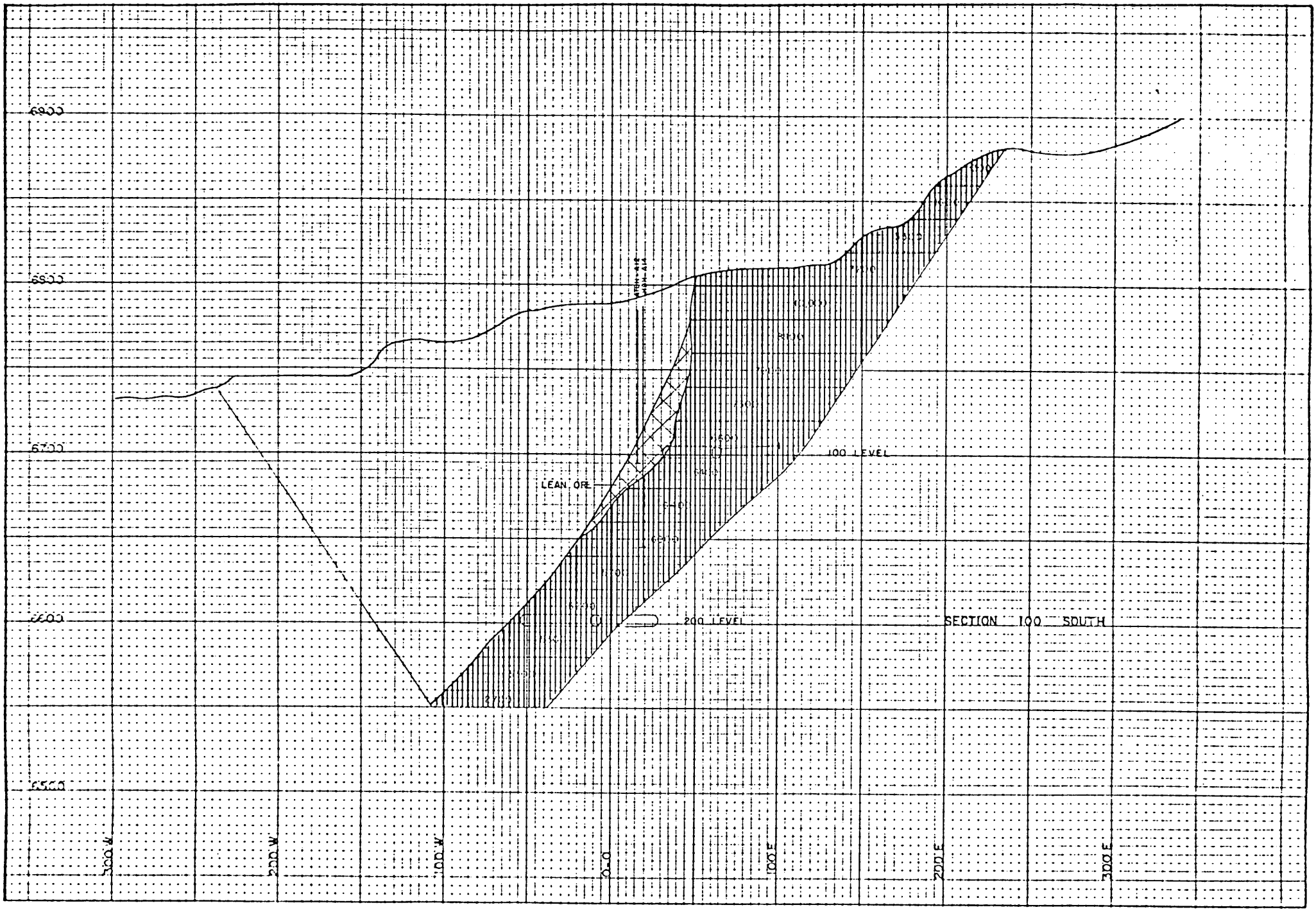
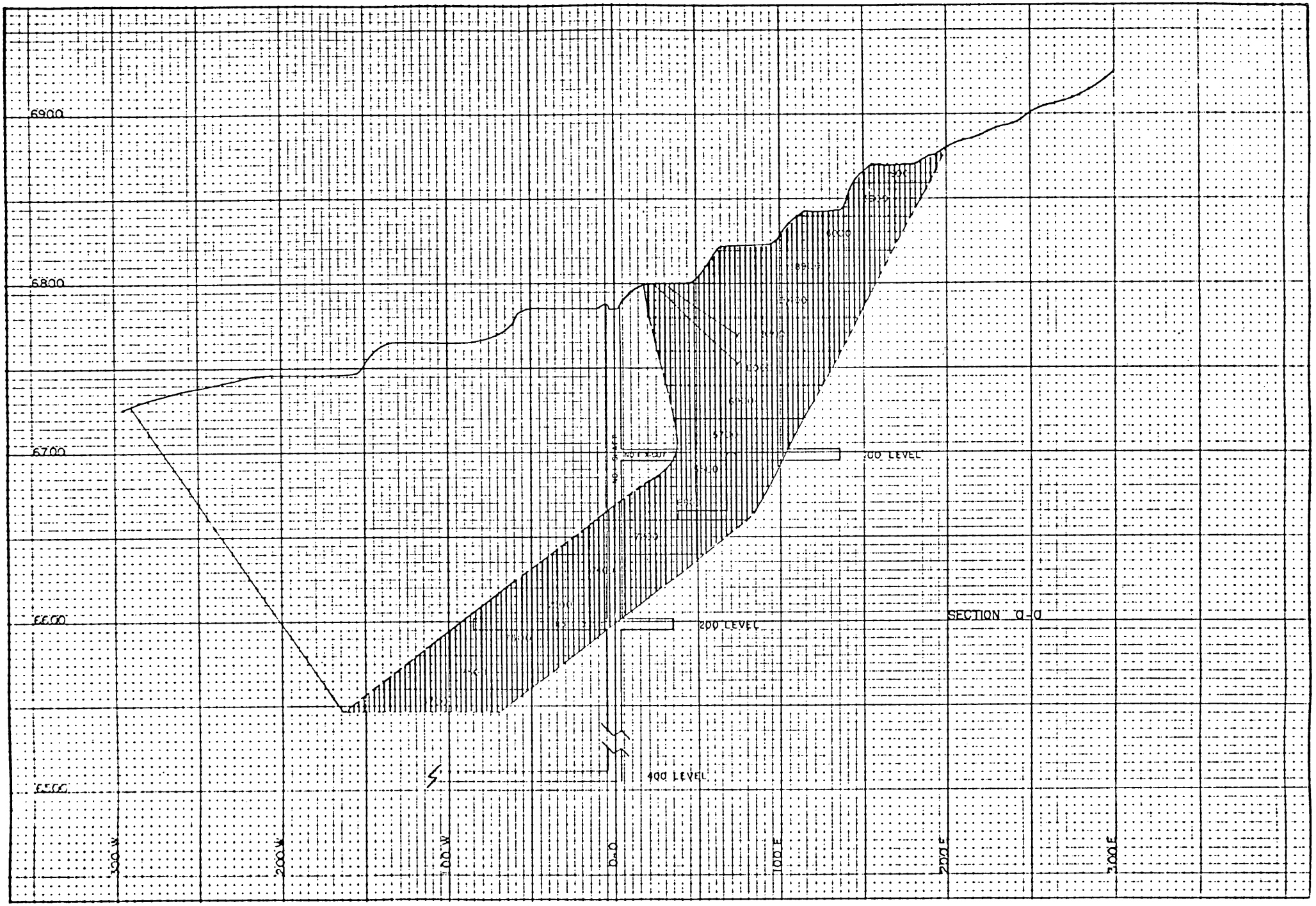
200 W
100 W
0
100 E
200 E
300 E
55 LEVEL
32 LEVEL
00 LEVEL
200 LEVEL
SECTION 250 SOUTH

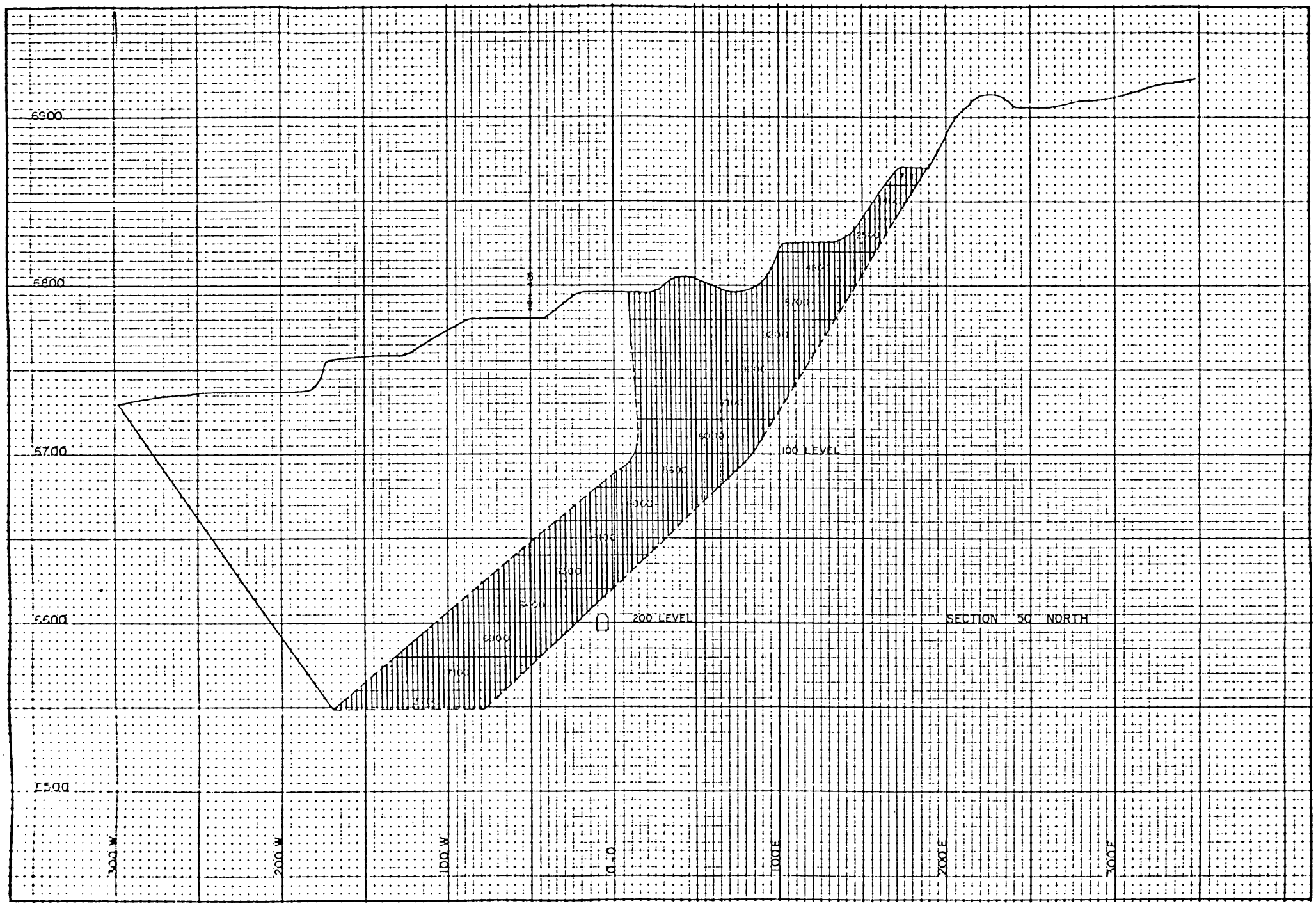

6900
6800
6700
6600
6500
LEAN ORE
LEAN ORE
LEAN ORE
20 LEVEL
82 LEVEL
100 LEVEL
200 LEVEL
SECTION 200 SOUTH
300 W
200 W
100 W
0-0
100 E
200 E
300 E


6900
6800
6700
6600
6500
300 W
200 W
100 W
0
100 E
200 E
300 E
LEAN ORE
100 LEVEL
200 LEVEL
SECTION 150 SOUTH


6900
6800
6700
6600
6500
300 W
200 W
100 W
0
100 E
200 E
300 E
LEAN ORE
100 LEVEL
200 LEVEL
SECTION 100 SOUTH

6900
6800
6700
6600
6500
100 LEVEL
200 LEVEL
SECTION 50 SOUTH
300 W
200 W
100 W
0-0
100 E
200 E
300 E


6900
6800
6700
6600
6500
300 W
200 W
100 W
0-0
100 E
200 E
300 E
200 LEVEL
400 LEVEL
SECTION 0-0


6900
6800
6700
6600
6500
300 W
200 W
100 W
0.0
100 E
200 E
300 E
100 LEVEL
200 LEVEL
SECTION 50 NORTH

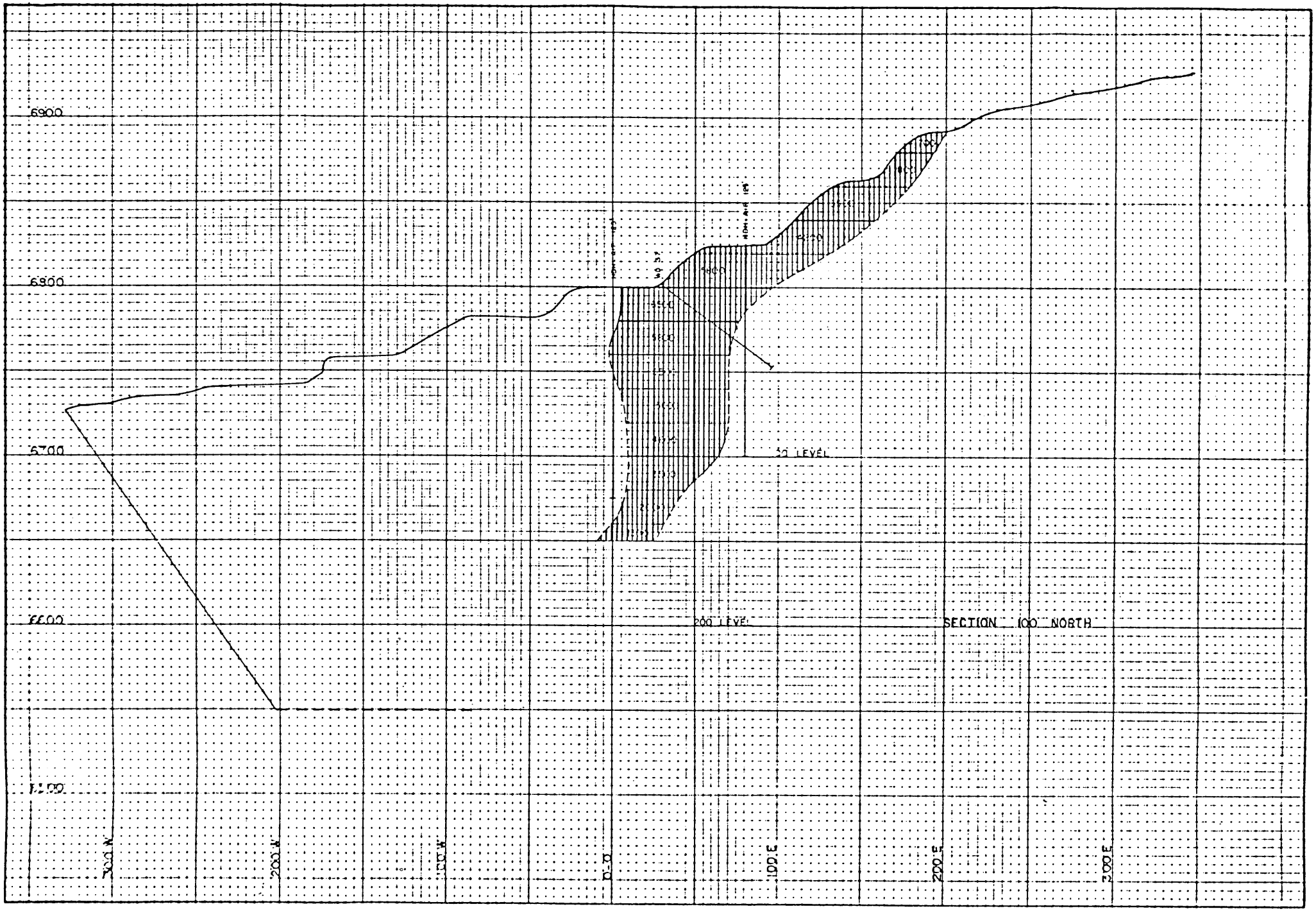
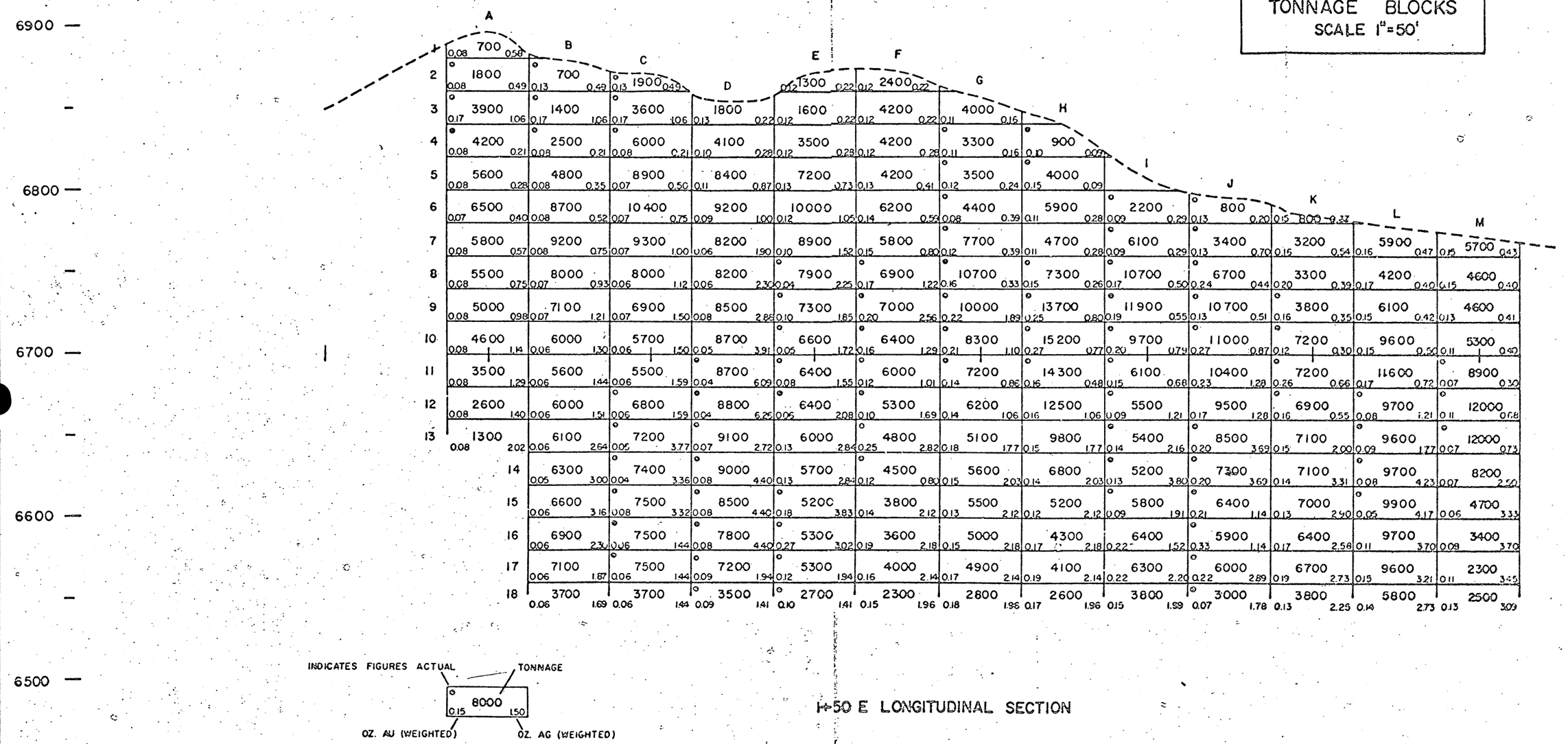
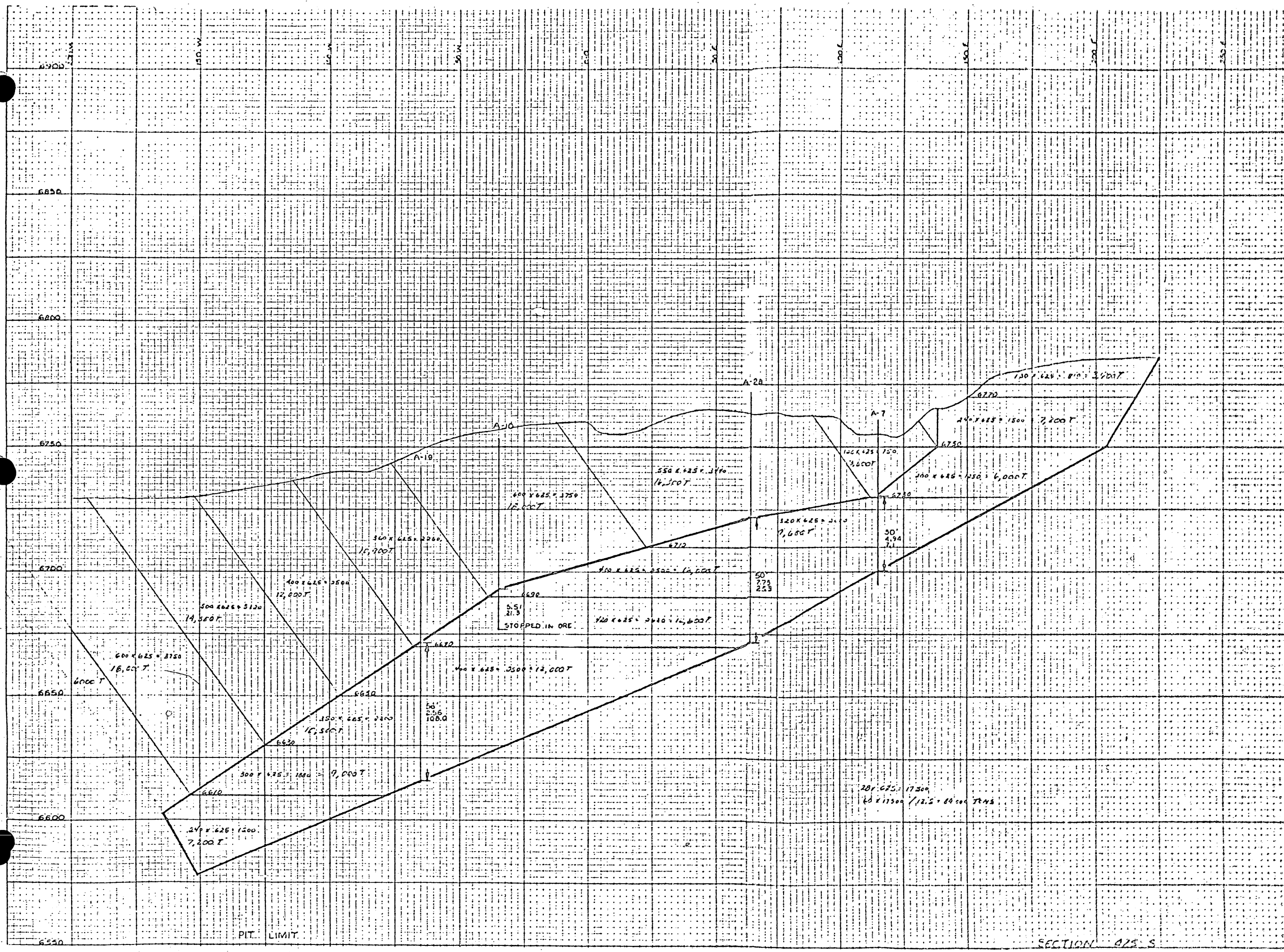

6900
6800
6700
6600
6500
300 W
200 W
100 W
0-00
100 E
200 E
300 E
50 LEVEL
200 LEVEL
SECTION 100 NORTH

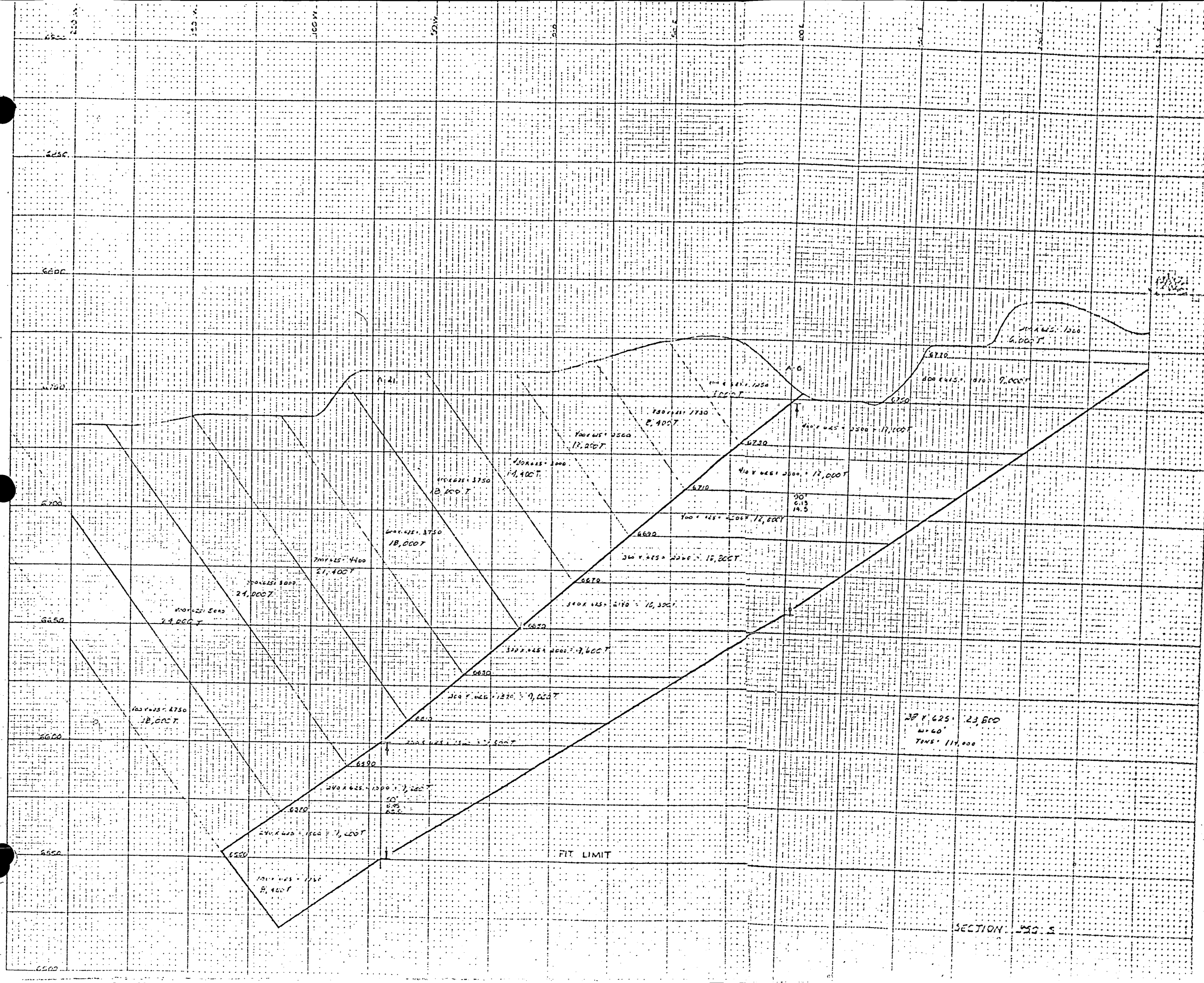
PLATE VI

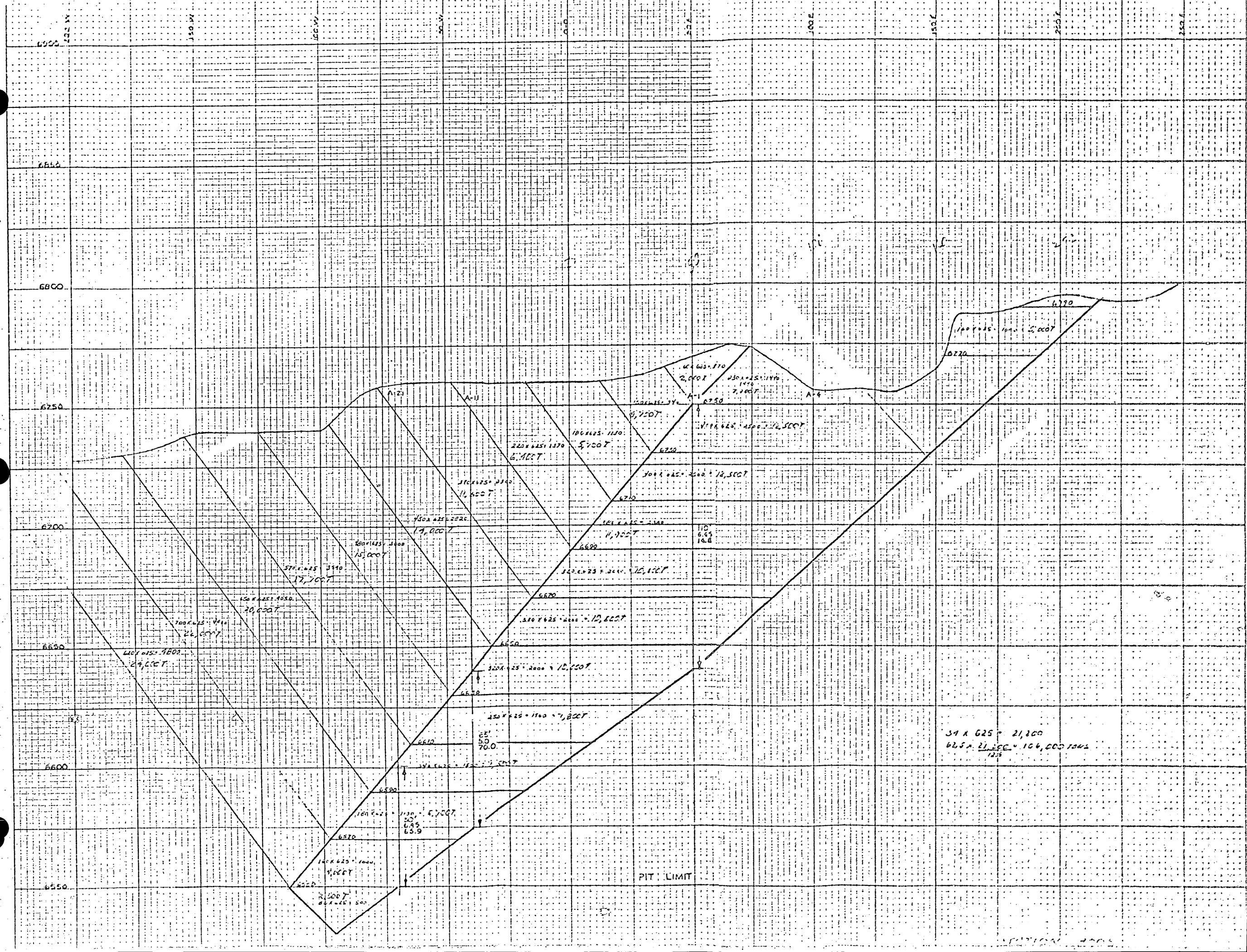
ATLANTA MINE TONNAGE BLOCKS
SCALE 1"=50'

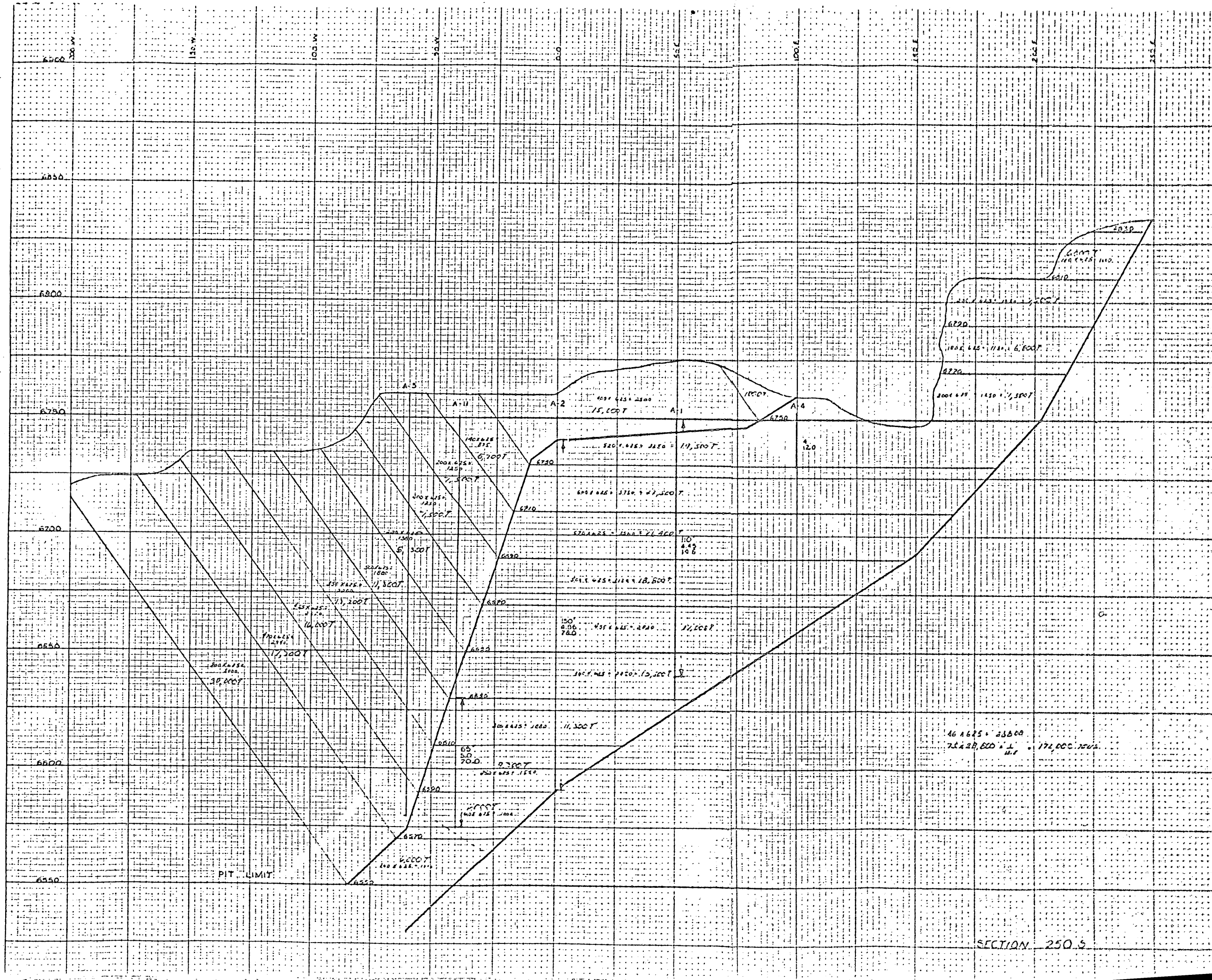


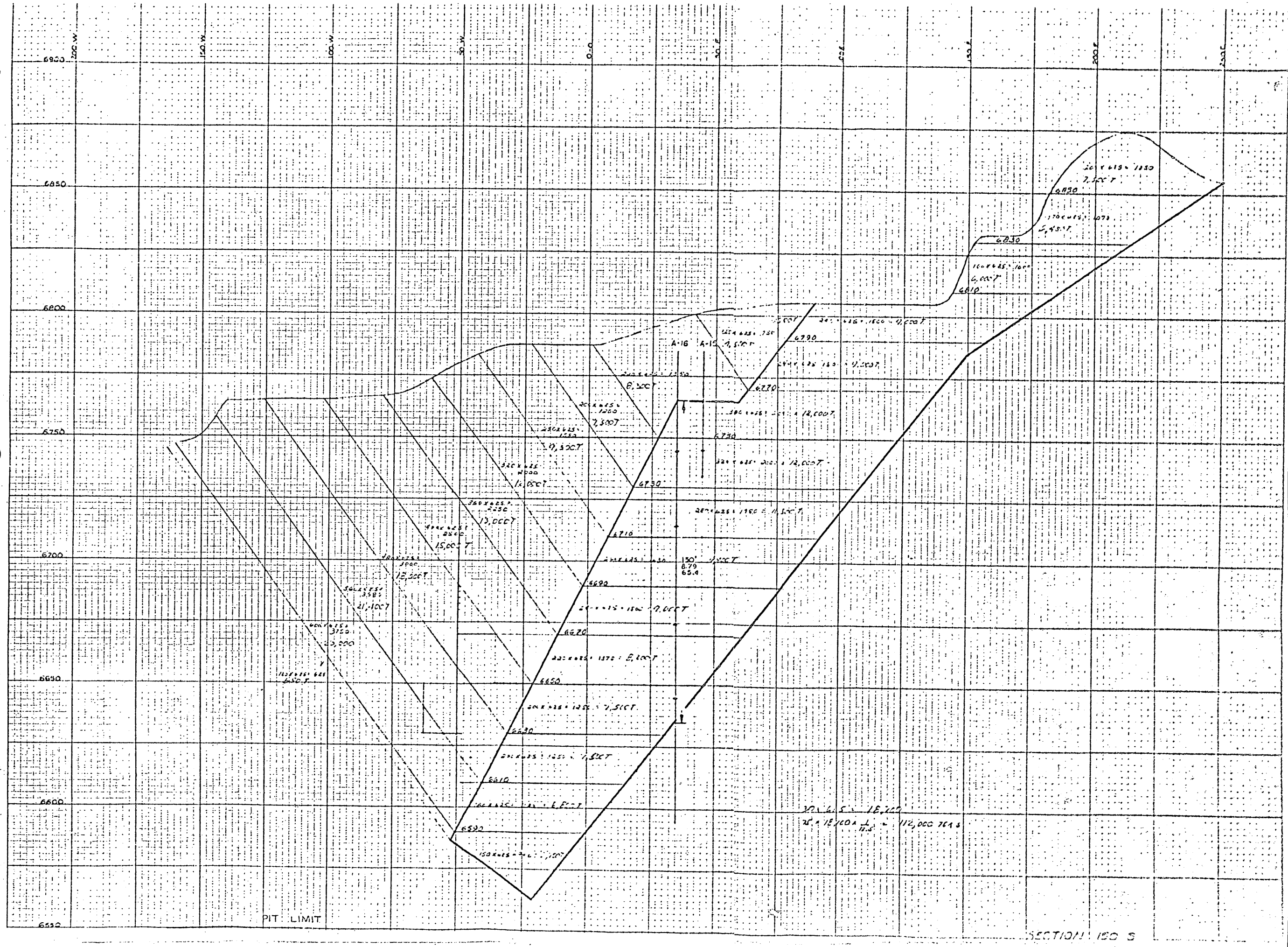
1+50 E LONGITUDINAL SECTION

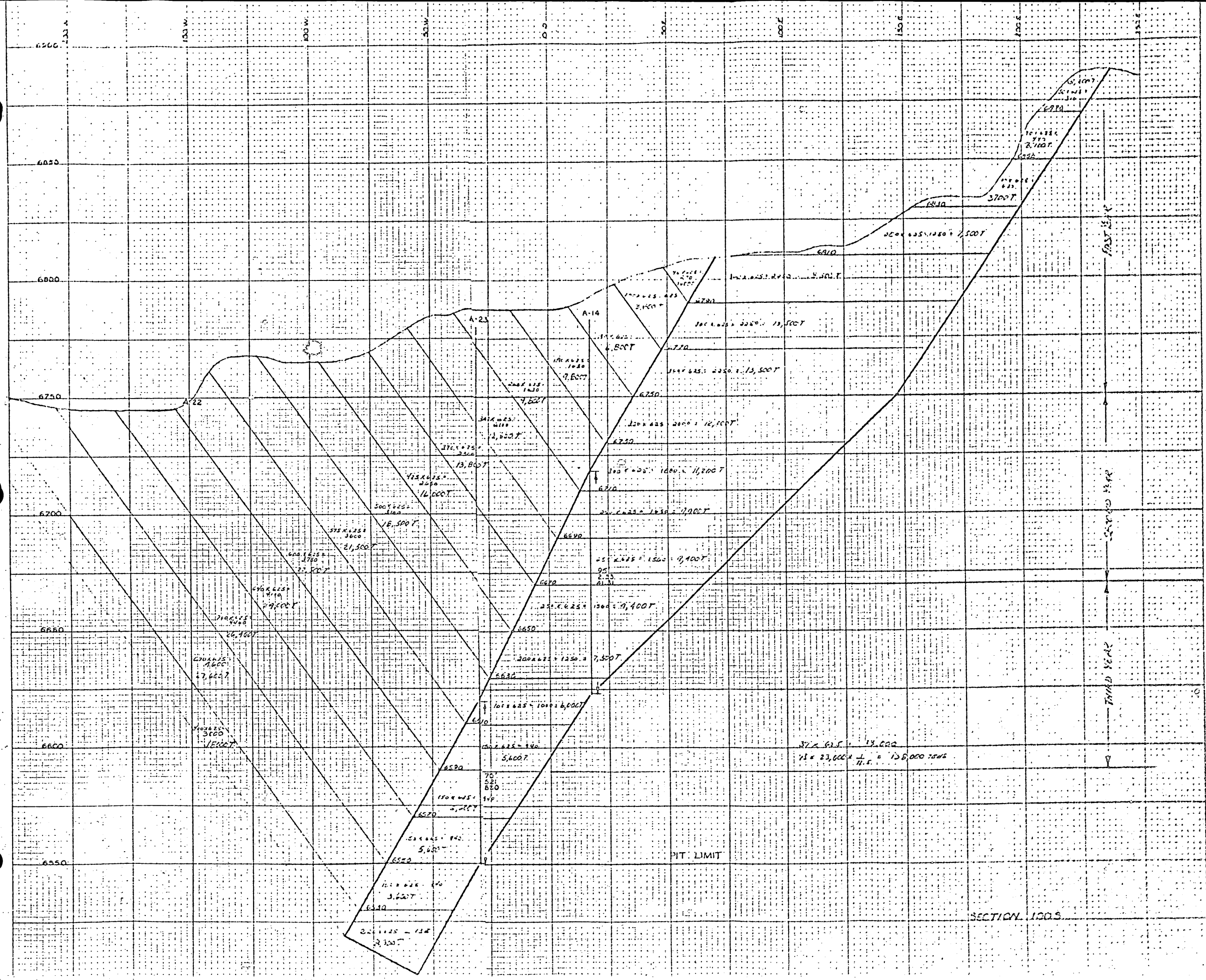

6900
6850
6800
6750
6700
6650
6600
6550
150 W
100 W
50 W
0
50 E
100 E
150 E
200 E
250 E
A-28
A-7
A-10
A-19
6770
6730
6710
6690
6670
6630
6610
STOPPED IN ORE
PIT LIMIT
SECTION 625 S

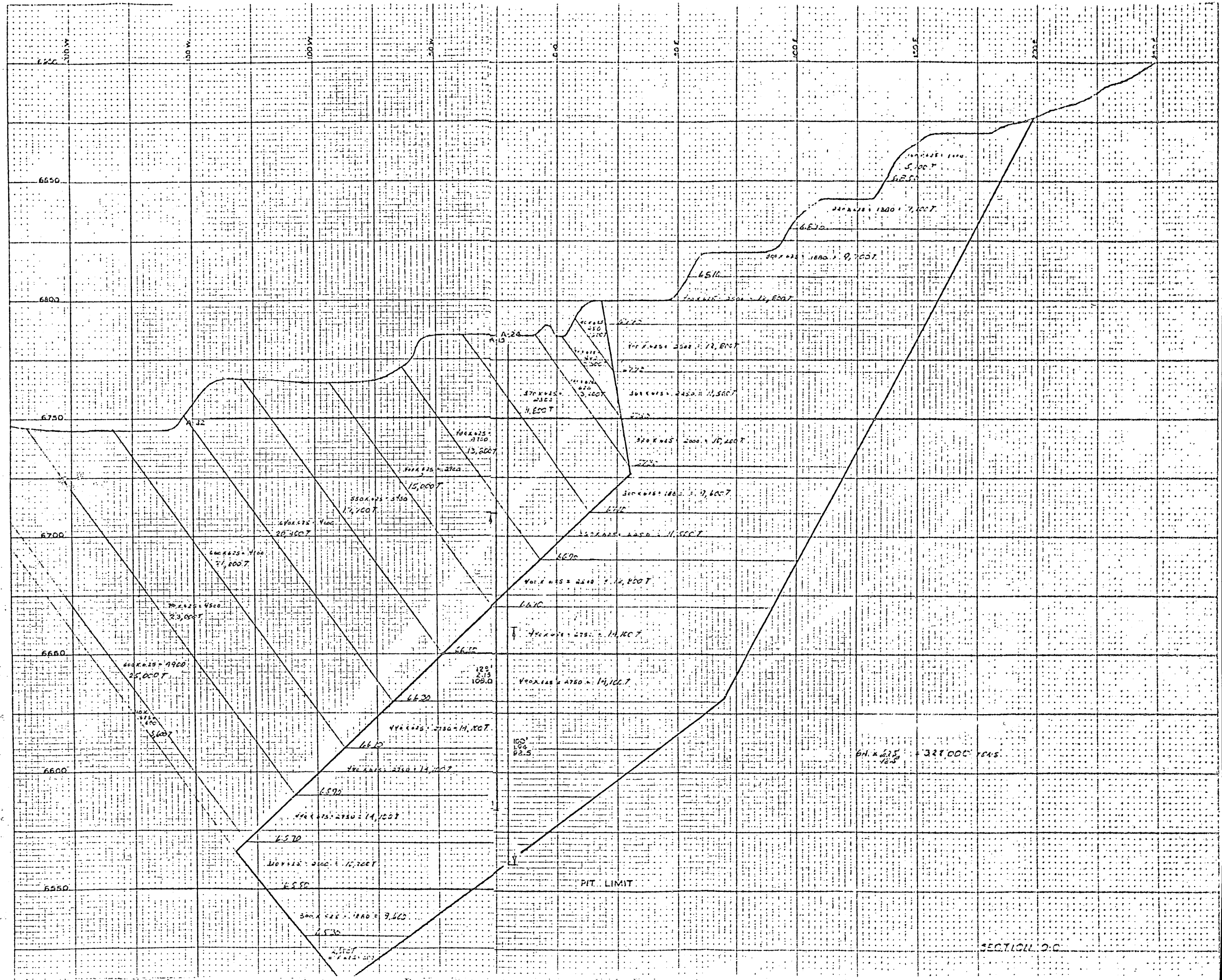

6750
6700
6650
6600
6550
6500
A-21
A-6
FIT LIMIT
SECTION

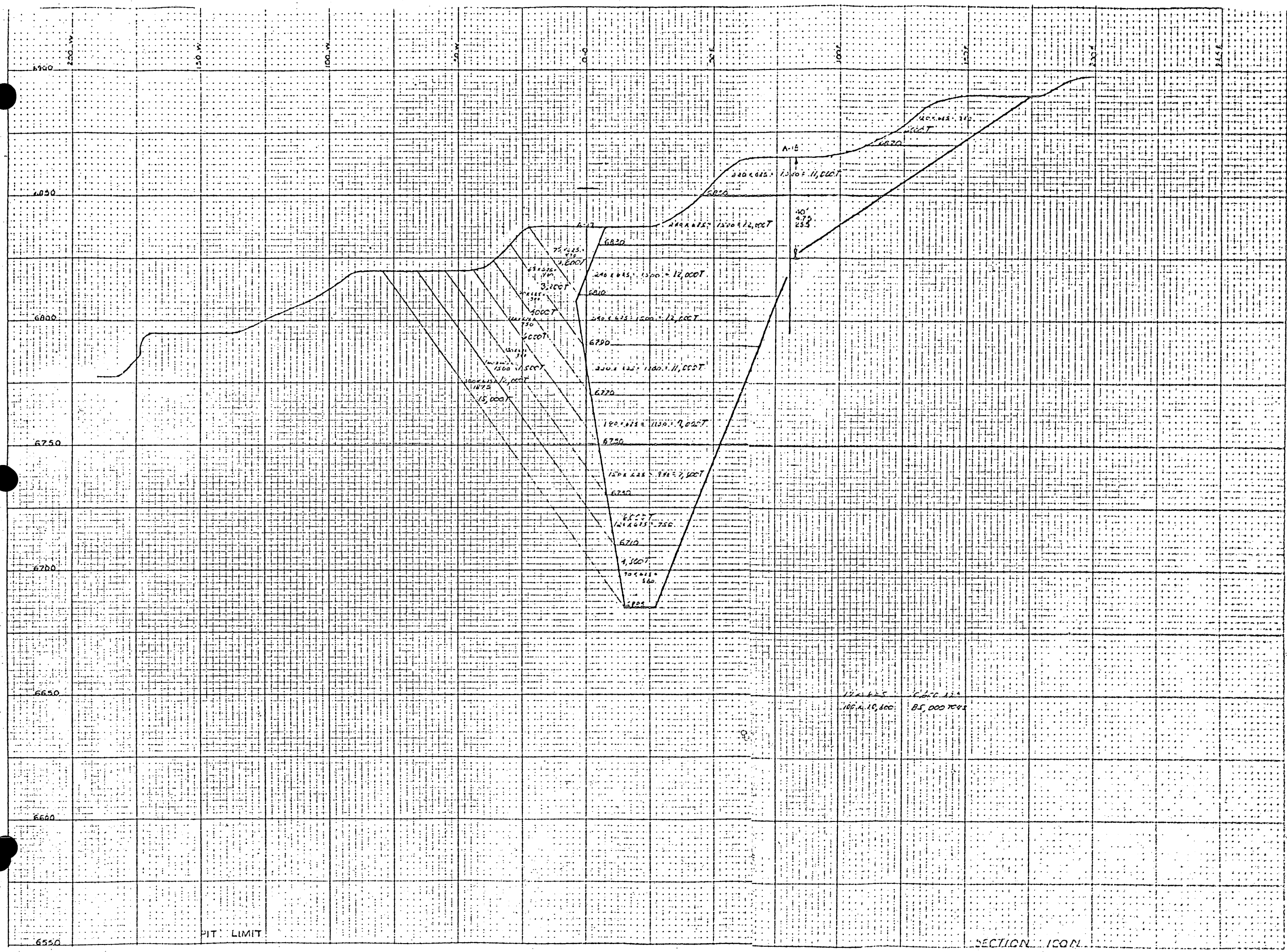

6900
6850
6800
6750
6700
6650
6600
6550
A-2
A-1
A-4
6770
6720
6750
6710
6690
6670
6650
6630
6610
6590
6570
6550
PIT LIMIT
34 x 625 = 21,250
625 x 21,250 / 2000 = 166,000 tons


6900
6850
6800
6750
6700
6650
6600
6550
A-5
A-11
A-2
A-1
A-4
15,000T
19,500T
6,700T
PIT LIMIT
SECTION 250 S


200 W
150 W
100 W
50 W
0-0
50 E
100 E
150 E
200 E
250 E
6900
6850
6800
6750
6700
6650
6600
6550
A-16
A-15
PIT LIMIT
SECTION 150 S

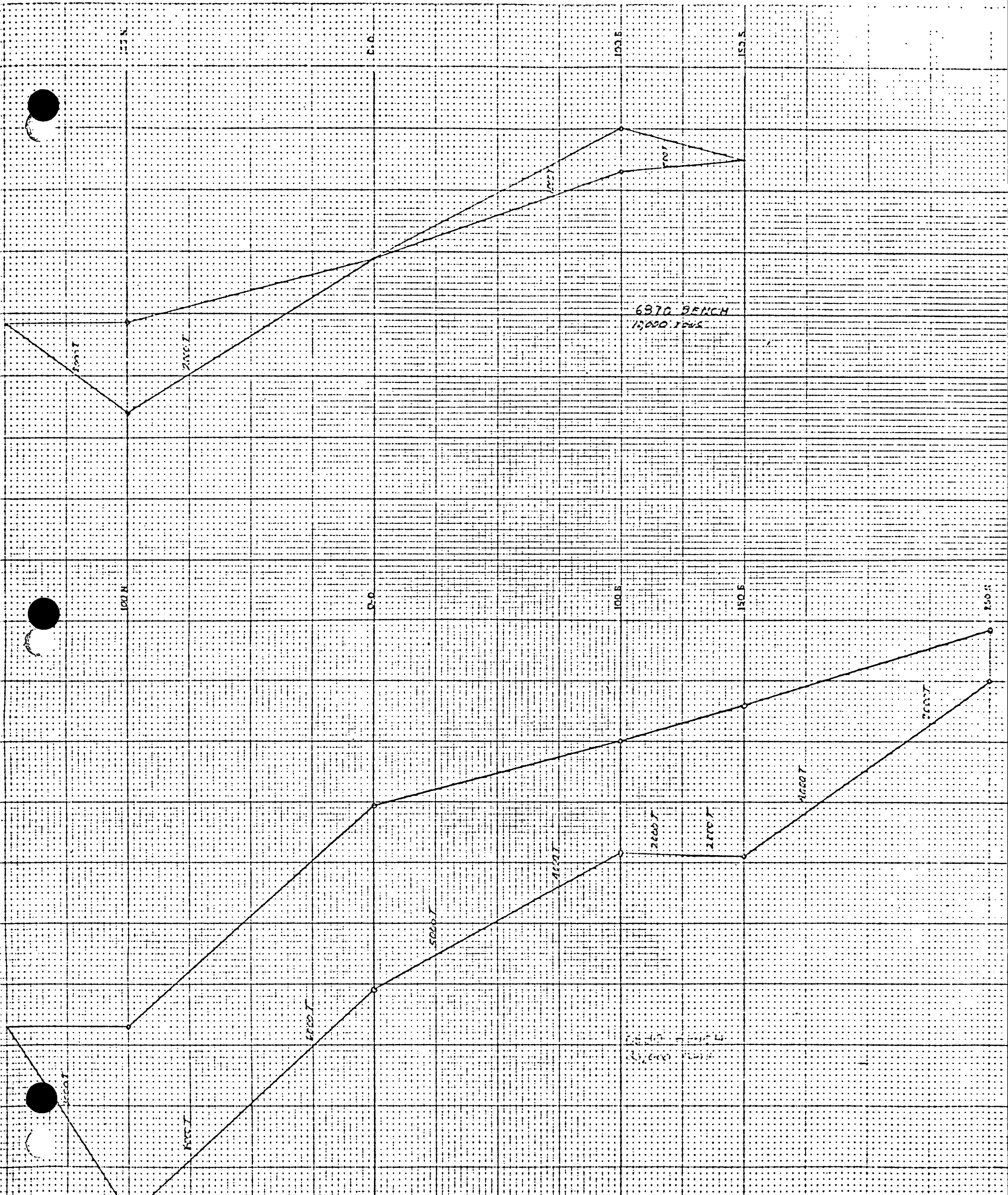

150 W
100 W
50 W
0
50 E
100 E
150 E
200 E
250 E
6900
6850
6800
6750
6700
6650
6600
6550
A-22
A-23
A-14
PIT LIMIT
SECTION 1005
THIRD SEAM
FIRST SEAM
SECOND SEAM

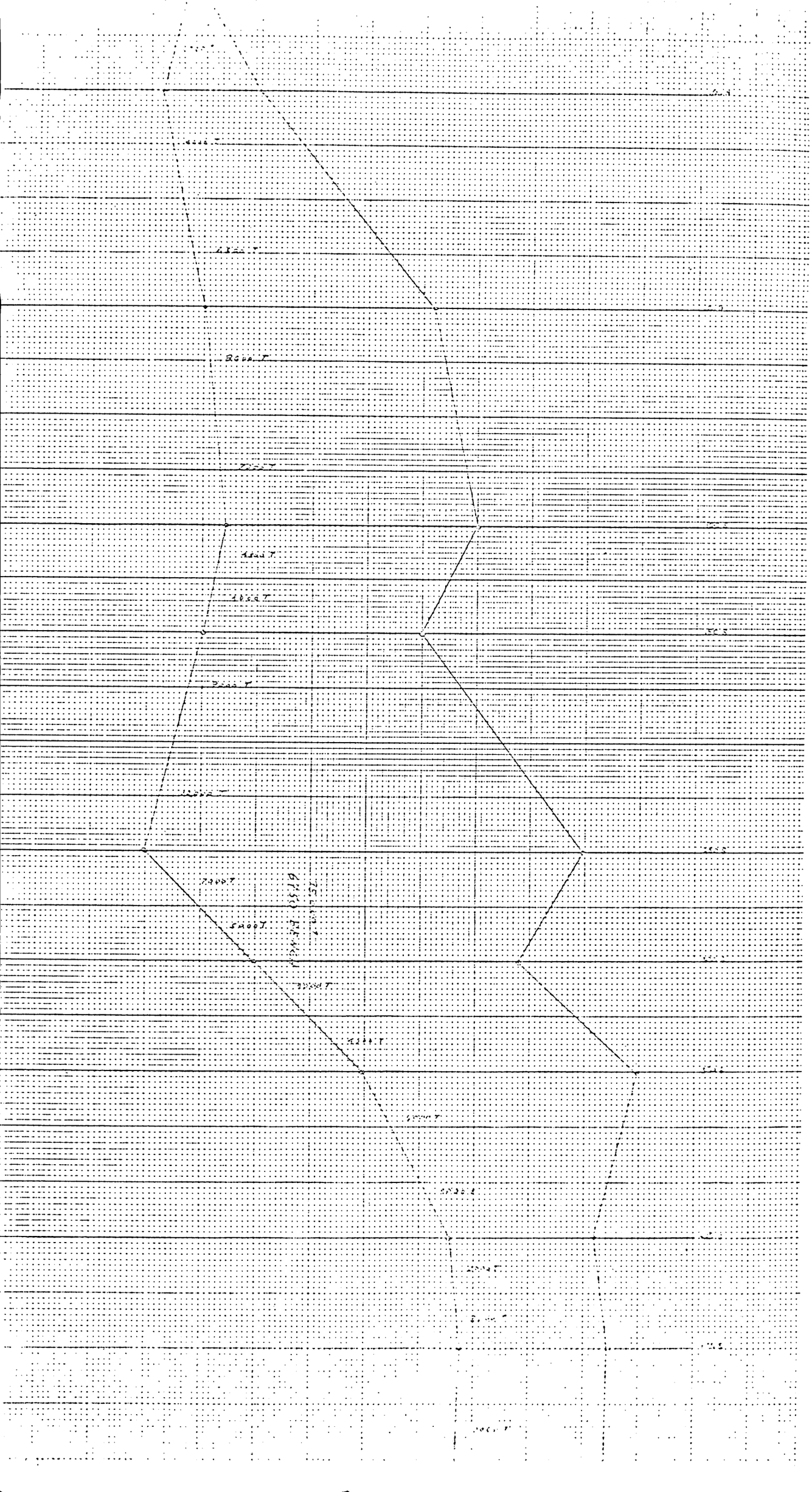

6850
6800
6750
6700
6650
6600
6550
PIT LIMIT
SECTION D-D

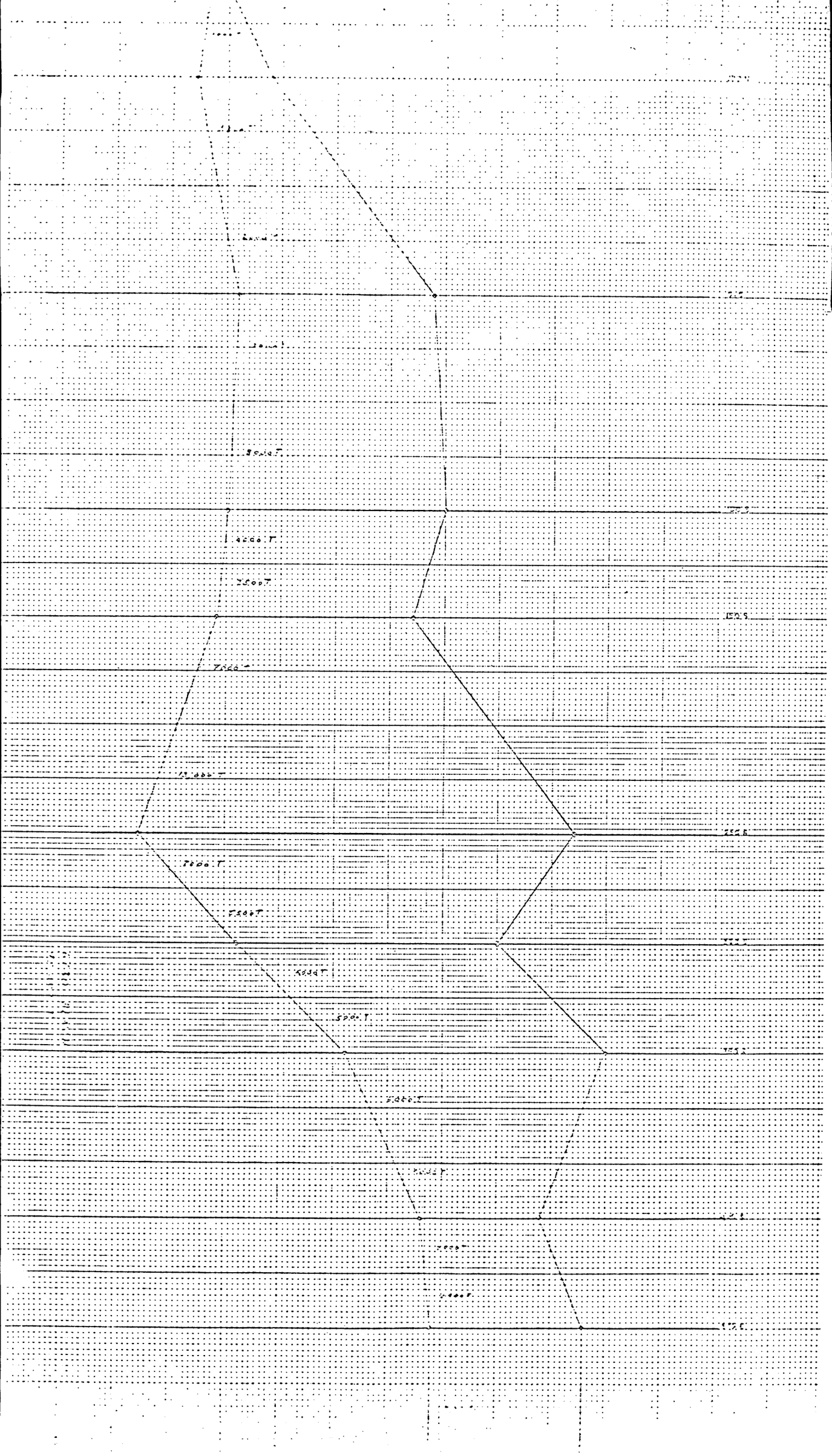

250 W
150 W
100 W
50 W
0
50 E
100 E
150 E
200 E
6900
6850
6800
6750
6700
6650
6600
6550
A-13
A-12
6830
6810
6790
6770
6750
6730
6710
6690
PIT LIMIT
SECTION 100N

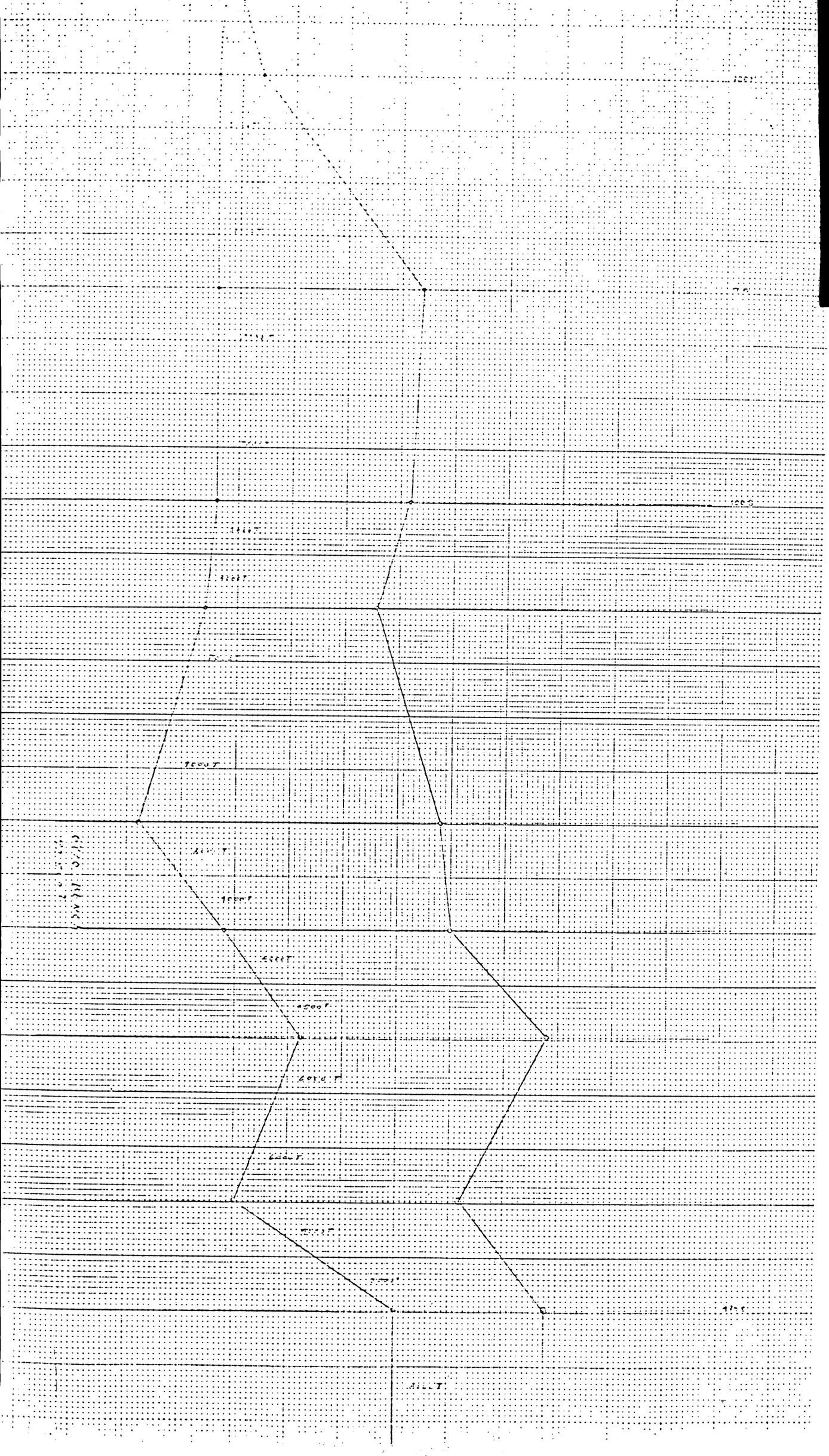
100 N
0 0
100 S
150 S
250 S
TOTAL 800/S
GRID DIST
6800 BENCH
43 000 TONS

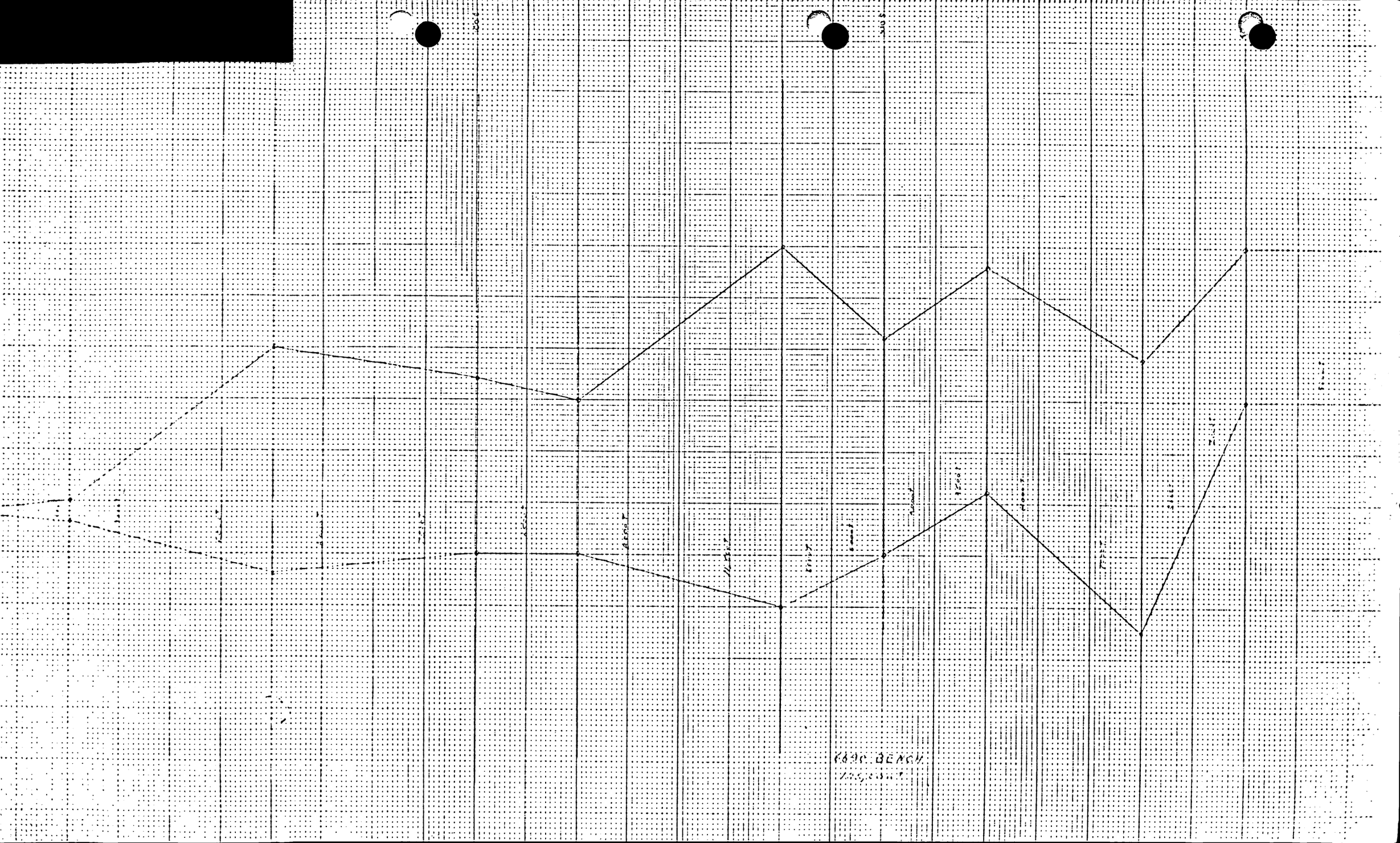
PLATE VIII

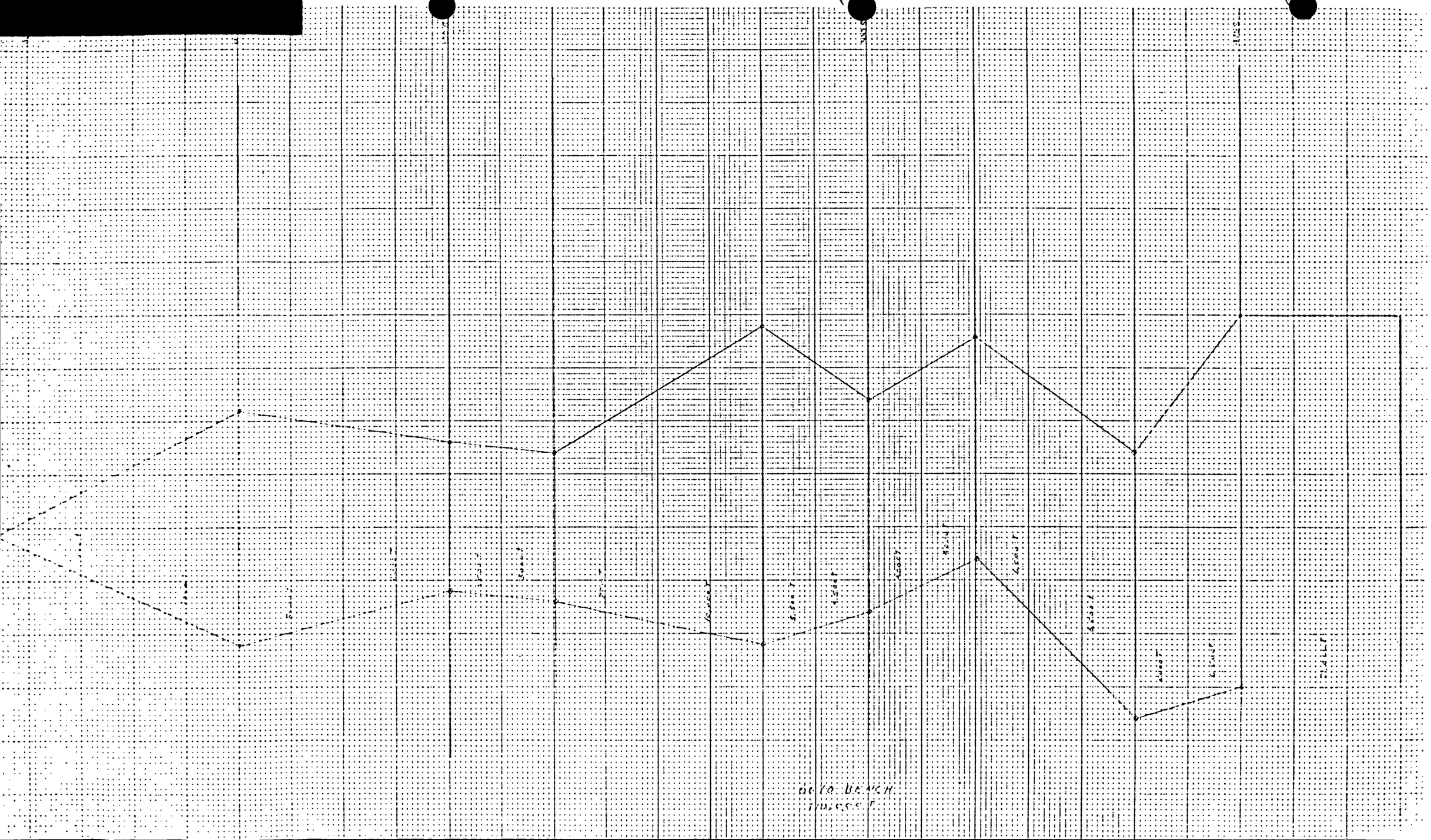

6370 BENCH
12,000 TONS







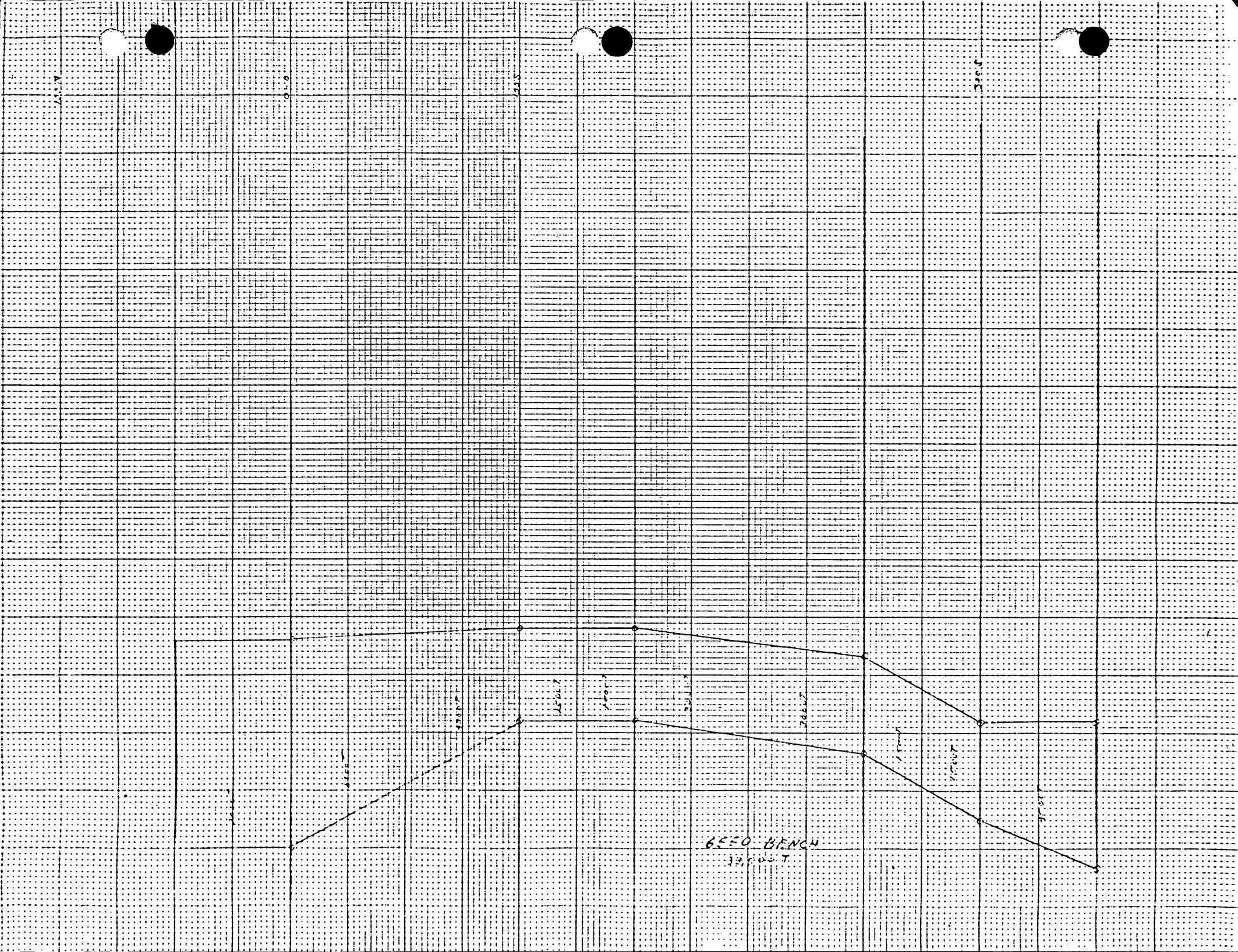

CAPE BEACH


OCTO BENCH
TRACER

415.3
300.3
100.1
50

BENCH

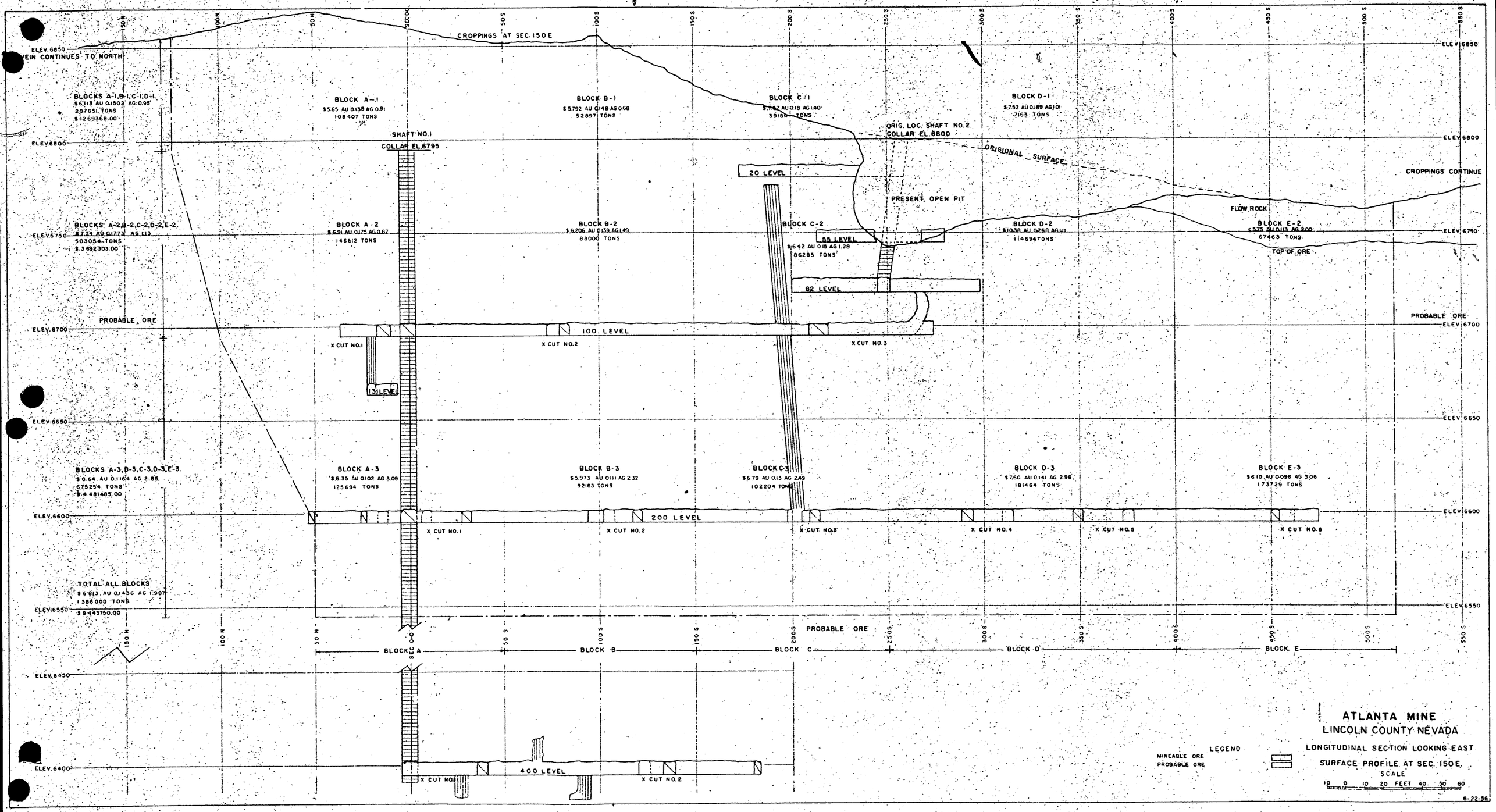
0570 BENCH
45.00
320.5
100.5
0.0

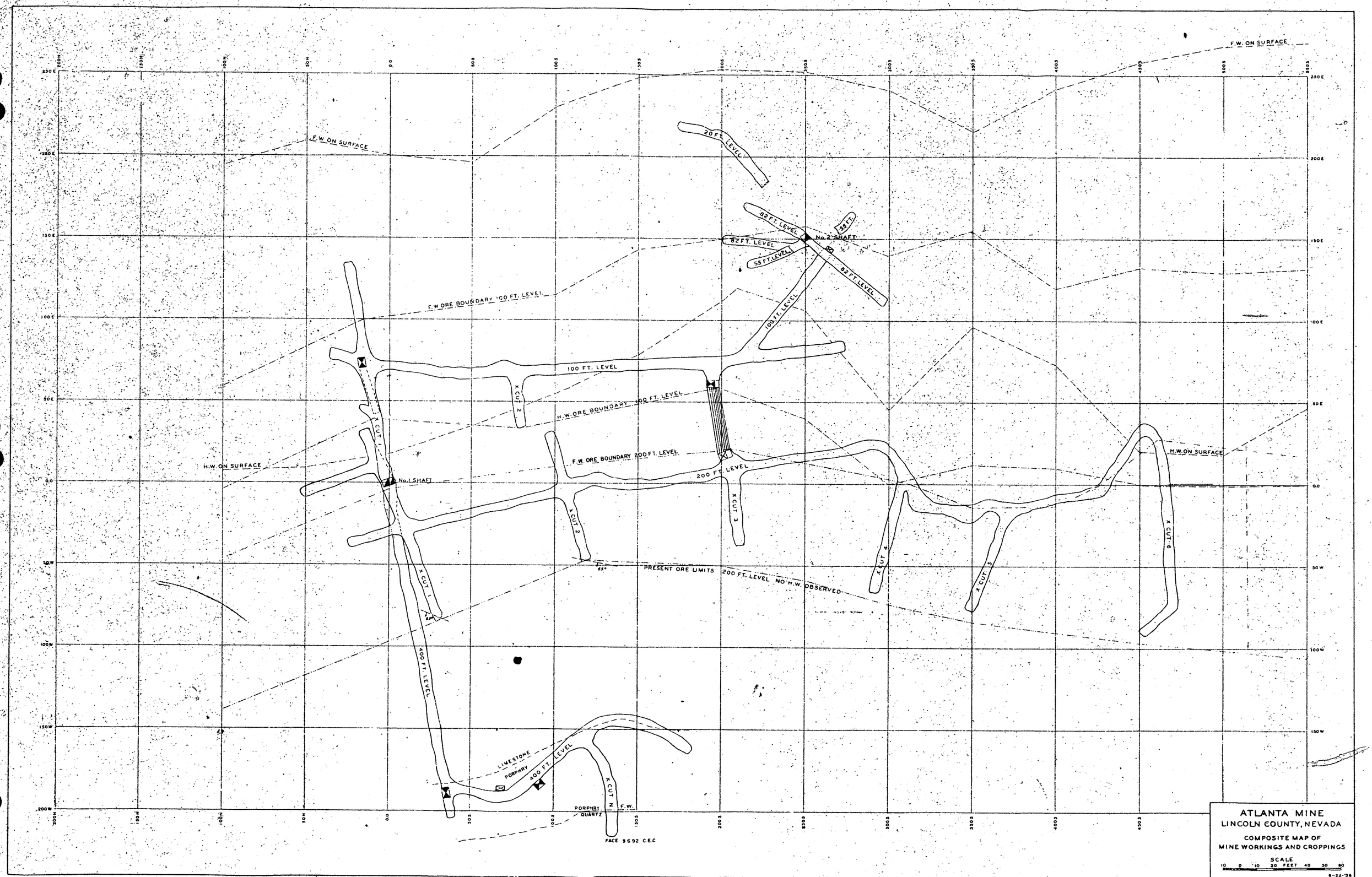

6550 BENCH

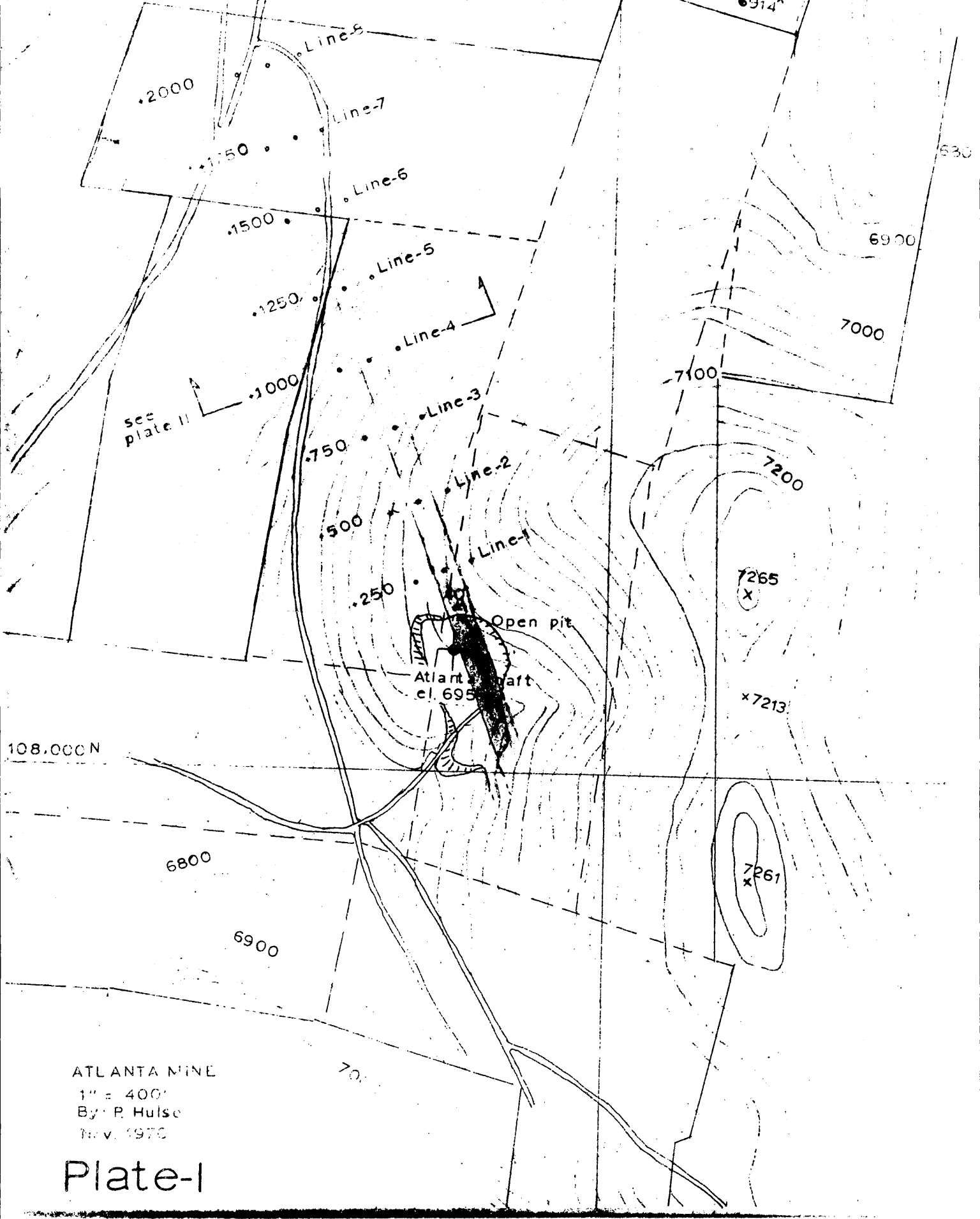
0.00

PLATE IX

PLATE VII


CROPPINGS AT SEC. 150 E
VEIN CONTINUES TO NORTH
ELEV. 6850
ELEV. 6800
ELEV. 6750
ELEV. 6700
ELEV. 6650
ELEV. 6600
ELEV. 6550
ELEV. 6450
ELEV. 6400
BLOCKS A-1, B-1, C-1, D-1
$6.113 AU 0.1502 AG 0.95
207651 TONS
$1269368.00
BLOCK A-1
$5.65 AU 0.138 AG 0.91
108407 TONS
BLOCK B-1
$5.792 AU 0.148 AG 0.68
52897 TONS
BLOCK C-1
$7.167 AU 0.18 AG 1.40
39184 TONS
BLOCK D-1
$7.52 AU 0.189 AG 1.01
7163 TONS
SHAFT NO. 1
COLLAR EL. 6795
ORIG. LOC. SHAFT NO. 2
COLLAR EL. 6800
ORIGINAL SURFACE
20 LEVEL
PRESENT OPEN PIT
CROPPINGS CONTINUE
FLOW ROCK
BLOCKS A-2, B-2, C-2, D-2, E-2.
$7.34 AU 0.1773 AG 1.13
503054 TONS
$3692303.00
BLOCK A-2
$6.91 AU 0.175 AG 0.87
146612 TONS
BLOCK B-2
$6.206 AU 0.139 AG 1.49
88000 TONS
BLOCK C-2
55 LEVEL
$6.42 AU 0.15 AG 1.28
86285 TONS
82 LEVEL
BLOCK D-2
$10.38 AU 0.268 AG 1.11
114694 TONS
BLOCK E-2
$5.75 AU 0.113 AG 2.00
67463 TONS
TOP OF ORE
PROBABLE ORE
100 LEVEL
X CUT NO. 1
X CUT NO. 2
X CUT NO. 3
131 LEVEL
BLOCKS A-3, B-3, C-3, D-3, E-3.
$6.64 AU 0.1164 AG 2.85
675254 TONS
$4481485.00
BLOCK A-3
$6.35 AU 0.102 AG 3.09
125694 TONS
BLOCK B-3
$5.973 AU 0.111 AG 2.32
92163 TONS
BLOCK C-3
$6.79 AU 0.13 AG 2.49
102204 TONS
BLOCK D-3
$7.60 AU 0.141 AG 2.96
181464 TONS
BLOCK E-3
$6.10 AU 0.0096 AG 3.06
173729 TONS
200 LEVEL
X CUT NO. 1
X CUT NO. 2
X CUT NO. 3
X CUT NO. 4
X CUT NO. 5
X CUT NO. 6
TOTAL ALL BLOCKS
$6.813 AU 0.1436 AG 1.987
1386000 TONS
$9443750.00
PROBABLE ORE
BLOCK A
BLOCK B
BLOCK C
BLOCK D
BLOCK E
400 LEVEL
X CUT NO. 1
X CUT NO. 2
LEGEND
MINEABLE ORE
PROBABLE ORE
ATLANTA MINE
LINCOLN COUNTY NEVADA
LONGITUDINAL SECTION LOOKING EAST
SURFACE PROFILE AT SEC. 150 E.
SCALE
10 0 10 20 FEET 40 50 60
6-22-56


ATLANTA MINE
LINCOLN COUNTY, NEVADA
COMPOSITE MAP OF
MINE WORKINGS AND CROPPINGS
SCALE
10 0 10 20 FEET 40 50 60
8-22-'36
F.W. ON SURFACE
F.W. ON SURFACE
H.W. ON SURFACE
H.W. ON SURFACE
20 FT. LEVEL
82 FT. LEVEL
82 FT. LEVEL
55 FT.
55 FT. LEVEL
82 FT. LEVEL
No. 2 SHAFT
100 FT. LEVEL
F.W. ORE BOUNDARY 100 FT. LEVEL
100 FT. LEVEL
X CUT 2
H.W. ORE BOUNDARY 100 FT. LEVEL
X CUT 1
F.W. ORE BOUNDARY 200 FT. LEVEL
200 FT. LEVEL
No. 1 SHAFT
X CUT 3
X CUT 2
X CUT 4
X CUT 5
X CUT 6
X CUT 1
65°
PRESENT ORE LIMITS 200 FT. LEVEL NO H.W. OBSERVED
400 FT. LEVEL
LIMESTONE
PORPHRY
400 FT. LEVEL
X CUT 7
PORPHRY
QUARTZ
F.W.
FACE 8692 C.E.C.
250 E
200 E
150 E
100 E
50 E
0.0
50 W
100 W
150 W
200 W
200 N
150 N
100 N
50 N
0.0
50 S
100 S
150 S
200 S
250 S
300 S
350 S
400 S
450 S
500 S
550 S



ATLANTA MINE
1" = 400'
By: P. Hulse
Nov. 1976

Plate-I

MME Form 40
(Revised Nov. 68)

Budget Bureau No. 46-R13
Approval expires Dec. 1971

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR FINANCIAL ASSISTANCE IN MINERALS EXPLORATION

Pursuant to Public Law 85-701 (72 Stat. 700; 30 U.S.C. 641)

NAME OF APPLICANT *(Full legal name and mailing address as it should appear on contract if one is executed.)*

BOBCAT PROPERTIES, INC.
(Rutherford Day, President)
1730 M. Street, N. W. Suite 606
Washington, D. C. 20036

APPLICANT DO NOT USE THIS BLOCK

DOCKET NUMBER

DATE RECEIVED

REGION

DIVISION CODE

BUSINESS ORGANIZATION *(Check one)*

- INDIVIDUAL [ ]
- CORPORATION [X]
- PARTNERSHIP [ ]
- OTHER *(Specify)* [ ]

STATE IN WHICH FIRM IS ORGANIZED Nevada

LIST CORPORATE OFFICERS OR PARTNERS HERE, IF APPLICABLE

NAME	ADDRESS	TITLE
N/A		

MINERAL(S) FOR WHICH YOU WISH TO EXPLORE
gold, silver--uraninum, molybdenum

ESTIMATED COST OF PROJECT
$100,000.00

PROPERTY NAME	LOCATION COUNTY	STATE
ATLANTA MINE	LINCOLN	NEVADA

GENERAL INSTRUCTIONS

Before filling out this application, please read the *OME Regulations for Obtaining Federal Assistance in Financing Explorations for Mineral Reserves* (30 CFR Chap. II). To assure prompt action, your application must provide all applicable material and information specified on the back of this application form. Avoid unnecessary correspondence and delays by submitting complete and accurate information. *Please submit two copies of this application and all accompanying papers* except as otherwise noted. Place your name and address on each sheet. Each item of information, maps, and reports required as a part of this application is described on the back of this form. Identify each attached statement by the item number to which it applies. If an item does not apply to your application, show the item number on your statement and after it write "not applicable." Maps or sketches should be used to supplement narrative descriptions of the property location and boundaries in item 2, existing mine workings and geology in item 3, and the proposed exploration work in item 5. When this information is not too complex, all of it may be shown on one map or sketch. All documents and other attachments submitted as a part of this application, except those in item 3(g) which you mark to be returned, become the property of the Government and will not be returned to the applicant. Send true copies, *not originals*, of leases, contracts, and other documents which are an essential part of your business records. *File this application with the Department of the Interior, U.S. Geological Survey, Office of Minerals Exploration, Washington, D.C. 20242, or with the nearest OME Field Office.*

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief, and that he would not ordinarily undertake the proposed exploration under current conditions and circumstances at his sole expense.

BOBCAT PROPERTIES, INC.

DATED

BY (Signature) Rutherford Day, President

TITLE

A wilfully false statement or certification to any Department or agency of the United States Government is a criminal offense.

INFORMATION REQUIRED WITH THIS APPLICATION

TABLE OF CONTENTS

1. Financial Eligibility:

(a) Submit evidence of efforts made within 90 days preceding the filing of this application to obtain credit from your bank of account and at least one other banking institution or other private source of credit. Such evidence shall include (1) true copies of your letters to credit sources which show date of loan request, amount and terms requested, and proposed use of loan funds and (2) true copies of replies from credit sources. If the loan was offered under terms which you consider unreasonable, state why you consider them so.

(b) List names and addresses of affiliated, parent, or controlling companies or organizations and state extent and nature of their interest.

(c) State how you propose to furnish your share of the cost of the exploration work.

2. Applicant's Rights in Land:

(a) State your interest in the land and mineral rights, whether owner, lessee, purchaser under contract, or other. If you are not the owner, submit one true copy of the lease, contract, or other document (with address of owner) under which you control the property. Describe all liens, mortgages, or other encumbrances on the land and state book and page number and official place where recorded.

(b) State the legal description (section, township, and range; metes and bounds; patent number of claims) of the land upon which you wish to explore and all adjacent land which you own or control. Describe any part of the land or workings which should not be subject to Government royalty and liens. If the land consists of unpatented claims, state book and page number for each recorded location notice, including amended locations, and official place where recorded. State all the names by which you know the property.

(c) For all land or mineral rights encumbered or not owned, submit five copies of Lien and Subordination Agreements signed by owner on MME Form 52. If the agreements cannot be obtained, state reasons and whether you can furnish a performance bond.

SEE PAGE -3

3. Physical Description:

(a) Describe in detail and illustrate with maps or sketches all mining or exploration operations which you know have been or are being conducted upon the land. Include existing mine workings and all production facilities.

(b) State your interest, if any, in operations described in (a)

(c) State, if you know, the past and current production, supporting your statement with copies of settlement sheets, mine records, or published data if available.

(d) Describe known ore reserves, giving quantities and grades.

(e) Describe by narrative and maps or sketches the geologic features of the property, including ore minerals, geologic formations if known, and type of deposit (vein, bedded, etc.).

(f) If you have sampled the area you propose to explore, show where the samples were taken, describe sampling methods used, and provide copies of assay certificates. State your reasons for expecting to find ore.

(g) Send with your application at least *two* copies of all geologic or engineering reports, assay maps, or technologic information which you have, indicating whether you require their return.

4. Accessibility of Property:

see page - 4

(a) To aid the OME representative who may examine the property state name, address, and telephone number of person who will meet him; give directions for reaching the property; and describe accessibility of property and of any mine workings.

(b) Name the shipping and supply points and state the distances to the property.

5. Exploration Work:

see page-5

(a) Describe fully the proposed exploration work giving individual footages and sizes of openings *for each item of work*. Use narrative, maps, plans, and sections as necessary. Show location of the proposed work as related to geologic features such as veins, ore-bearing beds, contacts of rock formations, etc. Show also the relation of the proposed work to any existing mine workings and to *land boundaries* or to the closest identifiable corner.

(b) If an access road must be built, show the proposed location on the property map and state the length, type and construction methods proposed.

(c) If an OME contract is executed, state how soon thereafter work would be started and finished. State your anticipated average daily or monthly rate of progress for each type of work.

6. Experience:

see page - 7

State your operating experience and background to conduct this exploration work and also that of the person who will supervise the work.

7. Estimate of Costs:

see page - 8

Furnish detailed estimates of the necessary costs for time and materials *for each item of the work proposed in 5(a)* under the headings listed below with a total for each heading and the estimated total cost of the work. Costs for any work to be performed by an independent contractor should be listed separately under category (a) below. Costs for any work that is not to be performed by an independent contractor should be listed under categories (b) through (g).

(a) Independent contracts. State the total cost of any proposed independent contract for all or any part of the work, and the number of units and the unit cost for each type of work, such as per foot of drilling, per foot of drifting, per hour of bulldozer operations, or per cubic yard of material moved. Cost estimates should be supported by bids from three contractors if possible. (*Note*—If none of the work is to be contracted, write "none" after this item.)

(b) Personal services. The cost of supervision, engineering and geological services, outside consultants, and labor should be itemized by numbers and classes of employees; rates of wages, salaries or fees; and periods of employment. State whether these services are available.

(c) Operating materials and supplies. List items of material and supplies giving quantity and price of each. Include under this heading power, water, and fuel, and units of equipment and tools costing less than $50 each.

(d) Operating equipment. List items of equipment and tools costing $50 or more per unit. Give specifications and indicate how each item is to be acquired—i. e., rented, purchased or provided by the applicant. If rented or purchased, state the estimated rental or purchase price. If furnished by the applicant, state condition and present fair market value.

(e) Initial rehabilitation and repairs. Describe the type and the cost of *initial* rehabilitation or repair of existing buildings, fixtures, installations (exclusive of mine workings), and movable operating equipment now owned by the applicant which will be used in the exploration work.

(f) New buildings, fixtures, installations. Describe each building, fixed improvement, and installation to be purchased, constructed, or installed for the exploration work, stating specifications and cost including labor, materials, and supervision.

(g) Miscellaneous. Describe the type and estimate the cost of repairs and maintenance of the operating equipment listed in 7(d). Do not repeat initial repairs listed in 7(e). Show also the costs of analytical work, accounting, workmen's compensation and employees' liability insurance, payroll taxes, and other required costs that do not fall within the previous categories. [*Note*—The Government will not contribute to costs incurred before the date of the contract, or to costs of or incident to: (1) acquiring, using, or possessing land and any existing improvements, facilities, buildings, installations, and appurtenances, or the depreciation and depletion thereof; (2) general overhead, corporate management, interest and taxes (other than payroll and sales taxes); (3) insurance (other than employees liability insurance); and (4) damages to persons or property (other than authorized repair to or replacement of equipment or other property used in the work.)

Form 40
(Revised Nov. 68)

Approval expires Dec. 1971

letter copy.

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR FINANCIAL ASSISTANCE IN MINERALS EXPLORATION

Pursuant to Public Law 85—701 (72 Stat. 700; 30 U.S.C. 641)

NAME OF APPLICANT *(Full legal name and mailing address as they should appear on contract if one is executed.)*

BOBCAT PROPERTIES, INC.
(Rutherford Day, President)
1730 M. Street, N. W. Suite 606
Washington, D. C. 20036

APPLICANT DO NOT USE THIS BLOCK

DOCKET NUMBER

DATE RECEIVED

REGION

DIVISION CODE

BUSINESS ORGANIZATION *(Check one)*

- INDIVIDUAL [ ]
- CORPORATION [X]
- PARTNERSHIP [ ]
- OTHER *(Specify)* [ ]

STATE IN WHICH FIRM IS ORGANIZED Nevada

LIST CORPORATE OFFICERS OR PARTNERS HERE, IF APPLICABLE

NAME	ADDRESS	TITLE
N/A		

MINERAL(S) FOR WHICH YOU WISH TO EXPLORE
gold, silver--uraninum, molybdenum

ESTIMATED COST OF PROJECT
$100,000.00

PROPERTY NAME	LOCATION COUNTY	STATE
ATLANTA MINE	LINCOLN	NEVADA

GENERAL INSTRUCTIONS

Before filling out this application, please read the *OME Regulations for Obtaining Federal Assistance in Financing Explorations for Mineral Reserves* (30 CFR Chap. II). To assure prompt action, your application must provide all applicable material and information specified on the back of this application form. Avoid unnecessary correspondence and delays by submitting complete and accurate information. *Please submit two copies of this application and all accompanying papers* except as otherwise noted. Place your name and address on each sheet. Each item of information, maps, and reports required as a part of this application is described on the back of this form. Identify each attached statement by the item number to which it applies. If an item does not apply to your application, show the item number on your statement and after it write "not applicable." Maps or sketches should be used to supplement narrative descriptions of the property location and boundaries in item 2, existing mine workings and geology in item 3, and the proposed exploration work in item 5. When this information is not too complex, all of it may be shown on one map or sketch. All documents and other attachments submitted as a part of this application, except those in item 3(g) which you mark to be returned, become the property of the Government and will not be returned to the applicant. Send true copies, *not originals*, of leases, contracts, and other documents which are an essential part of your business records. *File this application with the Department of the Interior, U.S. Geological Survey, Office of Minerals Exploration, Washington, D. C. 20242, or with the nearest OME Field Office.*

CERTIFICATION

The undersigned, whether as an individual, corporate officer, partner, or otherwise, both in his own behalf and acting for the applicant, certifies that the information set forth in this form and accompanying papers is correct and complete, to the best of his knowledge and belief, and that he would not ordinarily undertake the proposed exploration under current conditions and circumstances at his sole expense.

BOBCAT PROPERTIES, INC.

Rutherford Day
BY (Signature)

Rutherford Day, President
TITLE

DATED

A wilfully false statement or certification to any Department or Agency of the United States Government is a criminal offense.

INFORMATION REQUIRED WITH THIS APPLICATION

TABLE OF CONTENTS

1. Financial Eligibility:

(a) Submit evidence of efforts made within 90 days preceding the filing of this application to obtain credit from your bank of account and at least one other banking institution or other private source of credit. Such evidence shall include (1) true copies of your letters to credit sources which show date of loan request, amount and terms requested, and proposed use of loan funds and (2) true copies of replies from credit sources. If the loan was offered under terms which you consider unreasonable, state why you consider them so.

(b) List names and addresses of affiliated, parent, or controlling companies or organizations and state extent and nature of their interest.

(c) State how you propose to furnish your share of the cost of the exploration work.

2. Applicant's Rights in Land:

(a) State your interest in the land and mineral rights, whether owner, lessee, purchaser under contract, or other. If you are not the owner, submit one true copy of the lease, contract, or other document (with address of owner) under which you control the property. Describe all liens, mortgages, or other encumbrances on the land and state book and page number and official place where recorded.

(b) State the legal description (section, township, and range; metes and bounds; patent number of claims) of the land upon which you wish to explore and all adjacent land which you own or control. Describe any part of the land or workings which should not be subject to Government royalty and liens. If the land consists of unpatented claims, state book and page number for each recorded location notice, including amended locations, and official place where recorded. State all the names by which you know the property.

(c) For all land or mineral rights encumbered or not owned, submit five copies of Lien and Subordination Agreements signed by owner on MME Form 52. If the agreements cannot be obtained; state reasons and whether you can furnish a performance bond.

3. Physical Description: see page -3

(a) Describe in detail and illustrate with maps or sketches all mining or exploration operations which you know have been or are being conducted upon the land. Include existing mine workings and all production facilities.

(b) State your interest, if any, in operations described in (a)

(c) State, if you know, the past and current production, supporting your statement with copies of settlement sheets, mine records, or published data if available.

(d) Describe known ore reserves, giving quantities and grades.

(e) Describe by narrative and maps or sketches the geologic features of the property, including ore minerals, geologic formations if known, and type of deposit (vein, bedded, etc.).

(f) If you have sampled the area you propose to explore, show where the samples were taken, describe sampling methods used, and provide copies of assay certificates. State your reasons for expecting to find ore.

(g) Send with your application at least *two* copies of all geologic or engineering reports, assay maps, or technologic information which you have, indicating whether you require their return.

4. Accessibility of Property: see page-4

(a) To aid the OME representative who may examine the property state name, address, and telephone number of person who will meet him; give directions for reaching the property; and describe accessibility of property and of any mine workings.

(b) Name the shipping and supply points and state the distances to the property.

5. Exploration Work: see page-5

(a) Describe fully the proposed exploration work giving individual footages and sizes of openings *for each item of work.* Use narrative, maps, plans, and sections as necessary. Show location of the proposed work as related to geologic features such as veins, ore-bearing beds, contacts of rock formations, etc. Show also the relation of the proposed work to any existing mine workings and to *land boundaries* or to the closest identifiable corner.

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MME Form 40
(Revised Nov. 68)

Budget Bureau No. 42-R1368
Approval expires Dec. 1971

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

APPLICATION FOR FINANCIAL ASSISTANCE IN MINERALS EXPLORATION

Pursuant to Public Law 85—701 (72 Stat. 700; 30 U.S.C. 641)

NAME OF APPLICANT *(Full legal name and mailing address as they should appear on contract if one is executed.)*	APPLICANT DO NOT USE THIS BLOCK
	DOCKET NUMBER
	DATE RECEIVED
	REGION
	DIVISION CODE

BUSINESS ORGANIZATION *(Check one)*	LIST CORPORATE OFFICERS OR PARTNERS HERE, IF APPLICABLE NAME / ADDRESS / TITLE
INDIVIDUAL ☐	
CORPORATION ☐	
PARTNERSHIP ☐	
OTHER *(Specify)* ☐	
STATE IN WHICH FIRM IS ORGANIZED	

MINERAL(S) FOR WHICH YOU WISH TO EXPLORE	PROPERTY NAME	LOCATION COUNTY	STATE
ESTIMATED COST OF PROJECT			

GENERAL INSTRUCTIONS

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DATED

BY *(Signature)*

TITLE

A wilfully false statement or certification to any Department or Agency of the United States Government is a criminal offense.
U. S. Code, Title 18, Sec. 1001.

ED. EISENHAUER, JR.
C. EISENHAUER RAYMOND
LAWRENCE EARL RAYMOND
All members of American Institute of Mining, Metallurgical, and Petroleum Engineers

The EISENHAUER LABORATORIES

316 - 322 SOUTH SAN PEDRO STREET
PHONE 622-9328 (CODE 213) · LOS ANGELES, CALIF. 90013

Established 1916
ASSAYERS
METALLURGISTS
CHEMISTS
SPECTROGRAPHERS

June 4/71

Rutherford Day
1730 M St., N.W.
Washington, D.C.

Subject: Semiquantitative Spectrographic Analyses of Ores. (Pulps)

Marked:	#148 BP-2	#166 BP-B-1	#210 BP-B-2	#231 BP-B-3	#255 BP-A-1
Silicon-	major	major	47.0%	major	major
Aluminum-	10.0%	10.0%	10.0%	5.0%	5.0%
Magnesium-	1.0	2.0	3.0	2.0	1.0
Iron-	15.0	5.0	5.0	8.0	20.0
Calcium-	10.0	18.0	28.0	20.0	5.0
Sodium-	0.10	0.10	0.30	0.10	0.10
Potassium-	0.10	0.10	0.50	0.09	0.11
Antimony-	0.01	---	---	0.01	0.01
Lead-	0.03	0.03	0.01	0.03	0.03
• Chromium-	0.10 2 lb	0.10	0.03	0.05	0.04
Manganese-	0.10	0.10	0.08	0.10	0.10
Nickel-	---	0.05	0.05	0.04	0.03
Beryllium-	0.02	0.03	0.03	0.02	0.01
• Molybdenum-	2.0 - 40 lb	0.01	0.01	0.03	0.01
Vanadium-	• 0.10 2 lb	• 0.10	• 0.10	• 0.10	• 0.10
Lithium-	---	0.005	0.90	---	---
Yttrium-	---	---	0.50	0.30	0.10
Copper-	0.05	0.01	0.03	0.05	0.05
Silver-	0.03	0.01	0.001	0.001	0.005
Zinc-	0.30	0.22	0.03	0.02	0.30
Titanium-	2.0	2.0	2.0	2.0	2.0
Zirconium-	0.20	0.10	0.20	0.20	0.10
Cobalt-	---	---	0.01	0.01	0.03
Strontium-	---	0.20	0.20	0.20	0.10
Tungsten-	0.30	---	---	---	• 1.0
Barium-	0.09 4 lb	0.20	0.20	0.20	0.20
• Uranium-	0.20, tentatively identified	---	---	---	---

"Hot Spot"

Bradshaw

Atlanta →

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 12, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-2	55-60	none	trace								
"	60-65	none	0.01								
"	65-70	none	trace								
"	70-75	none	trace								
"	75-80	none	trace								
"	75-80 #2	none	trace								
"	80-85	none	trace								
"	85-90	trace	0.23								
"	90-95	trace	0.06								
"	95-100	trace	0.05								

CERT. # 3-4

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 12, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-2	0-10	0.005	0.41								
"	10-15	0.01	0.92								
"	15-20	0.01	1.20								
"	20-25	0.005	0.46								
"	25-30	0.01	0.31								
"	30-35	0.005	0.11								
"	35-40	trace	0.09								
"	40-45	trace	0.07								
"	45-50	trace	0.07								
"	50-55	none	0.02								

CERT. # 3-3

CHARGES $35.00

Carl Prosch
CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286
PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Date MAR. 12, 1971

Name PHIL HULSE

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-1	195-200	none	0.07								
"	200-205	trace	0.14								
"	205-210	0.02	0.99								
"	210-215	0.02	2.50								
"	215-220	0.02	1.69								

CERT. # 3-2

CHARGES $17.50

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 18, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-1	225-230	0.01	0.74								
"	230-235	0.01	0.80								
"	235-240	0.02	0.77								
"	240-245	0.02	0.59								
"	245-250	0.01	0.37								
"	235-250 Fines	trace	0.22								

CERT. # 3-11

CHARGES $21.00

CHEMIST

ED. EISENHAUER, JR.
C. EISENHAUER RAYMOND
LAWRENCE EARL RAYMOND
All members of American Institute of Mining, Metallurgical, and Petroleum Engineers

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SPECTROGRAPHERS

June 4/71

Rutherford Day
1730 M St., N.W.
Washington, D.C.

Subject: Semiquantitative Spectrographic Analyses of Ores (Pulps)

Marked:	#359 BP-A-7	#373 BP-A-8	#385 BP-A-9	#407 BP-A-10
Silicon-	40.0%	50.0%	40.0%	major
Aluminum-	0.50	2.0	4.5	15.0%
Magnesium-	5.0	10.0	5.0	1.0
Iron-	5.0	8.0	6.0	5.0
Calcium-	50.0	30.0	15.0	3.0
Sodium-	0.10	0.10	0.09	0.07
Potassium-	0.10	0.10	0.10	0.30
Boron-	---	---	---	0.05
Antimony-	---	0.01	0.01	---
Lead-	---	0.01	---	0.01
Chromium-	---	0.05	---	---
Arsenic-	---	0.50	0.50	---
Manganese-	0.50	0.50	0.20	0.05
Nickel-	---	0.05	0.01	---
Molybdenum-	---	0.01	0.03	0.01
Vanadium-	---	0.10	0.10	---
Lithium-	---	---	1.0	---
Yttrium-	---	0.30	0.10	---
Copper-	0.01	0.05	0.05	0.01
Silver-	0.001	0.01	0.003	0.0005
Zinc-	---	---	---	0.20
Titanium-	---	0.50	---	2.0
Zirconium-	---	---	---	0.30
Cobalt-	---	0.01	0.01	---
Strontium-	---	0.10	0.20	---
Barium-	0.50	0.50	30.0	0.20

Respectfully submitted,

The Eisenhauer Laboratories

C. Eisenhauer Raymond

ED. EISENHAUER, JR.
C. EISENHAUER RAYMOND
LAWRENCE EARL RAYMOND
All members of American Institute of Mining, Metallurgical, and Petroleum Engineers

The EISENHAUER LABORATORIES

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PHONE 622-9328 (CODE 213) · LOS ANGELES, CALIF. 90013

Established 1916
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SPECTROGRAPHERS

June 4/71

Rutherford Day
1730 M St., N.W.
Washington, D.C.

Subject: Semiquantitative Spectrographic Analyses of Ores. (Pulps)

Marked:	#289 BP-A-2	#294 BP-A-3	#309 BP-A-4	#318 BP-A-5	#346 BP-A-6
Silicon-	50.05%	major	major	30.0%	40.0%
Aluminum-	3.0	5.0%	10.0%	10.0	10.0
Magnesium-	2.0	2.0	2.0	1.0	5.0
Iron-	18.0	5.0	5.0	8.0	8.0
Calcium-	10.0	10.0	5.0	10.0	20.0
Sodium-	0.10	0.10	0.27	0.30	0.30
Potassium-	0.10	0.10	0.30	0.50	0.30
Boron-	0.10	0.10	---	---	---
Phosphorus-	---	---	0.50	---	---
Antimony-	0.01	0.01	---	---	0.03
Lead-	0.03	0.01	0.01	0.01	0.01
Chromium-	0.05	0.05	0.01	0.05	0.05
Manganese-	0.10	0.11	0.05	0.12	0.20
Gallium-	---	---	0.01	0.01	0.01
Nickel-	0.05	0.05	0.03	0.10	0.20
Beryllium-	0.01	0.01	0.01	0.009	0.01
Molybdenum-	0.03	0.01	0.05	0.03	0.03
Vanadium-	0.10	0.05	0.10	0.05	0.10
Lithium-	1.0	1.0	1.0	---	---
Yttrium-	---	---	0.10	0.30	0.30
Copper-	0.05	0.05	0.01	0.03	0.05
Silver-	0.01	0.03	0.03	0.03	0.005
Zinc-	0.30	0.10	0.05	0.27	0.10
Zirconium-	0.10	0.10	0.20	0.10	----
Cobalt-	0.01	0.01	---	0.03	0.01
Lanthanum-	---	---	---	0.20	---
Strontium-	0.20	0.10	0.28	0.50	0.20
Barium-	15.0	0.50	30.0	40.0	20.0
Thorium-	---	---	0.20, tentatively identified		

Respectfully submitted,
The Eisenhauer Laboratories

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 13, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-3	0-10	0.01	0.24								
"	10-15	0.02	0.37								
"	15-20	0.01	0.77								
"	20-25	0.01	0.94								
"	25-30	trace	0.14								
"	30-35	trace	0.10								
"	35-40	trace	0.11								

CERT. # 3-6

CHARGES $24.50

Gary Stewart
CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 13, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-3	40-45	0.01	0.28								
"	45-50	0.01	0.51								
"	50-55	0.01	0.92								
"	55-60	0.01	0.93								
"	60-65	0.01	0.79								
"	65-70	trace	0.17								
"	70-75	none	0.05								

CERT. # 3-7

CHARGES $24.50

Gary Stewart
CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286
PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Date Mar. 13, 1971

Name PHIL HULSE

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-4	0-10	trace	0.10								
"	10-15	none	0.04								
"	15-20	0.02	0.28								
"	20-25	0.02	0.42								
"	25-30	0.02	1.17								
"	30-35	0.02	0.75								
"	35-40	0.01	0.58								
"	40-45	0.01	0.53								
"	45-50	0.01	0.42								

CERT. # 3-8

CHARGES $31.50

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 13, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-5	175-180	none	trace								
"	180-185	none	trace								
"	185-190	none	trace								
"	190-195	none	trace								
"	195-200	none	trace								
"	200-205	0.02	1.78								
"	205-210	none	trace								
"											

CERT. # 3-9

CHARGES $24.50

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 13, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-5	210-215	none	none								
"	215-220	none	none								
"	220-225	none	none								
"	225-230	none	trace								

CERT. # 3-10

CHARGES $14.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 18, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-6	150-155	0.015	1.65								
"	155-160	0.015	1.00								
"	160-165	0.01	1.04								
"	165-170	0.01	0.65								
"	165-170 #2	0.01	0.60								
"	170-175	trace	0.14								
"	175-180	trace	0.18								
"	180-185	0.015	0.36								
"	185-190	0.01	0.55								
"	190-195	0.01	0.54								

CERT. # 3-12

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE Date Mar. 18, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-6	195-200	0.01	1.83								
"	200-205	0.01	1.09								
"	205-210	0.01	1.08								
"	210-215	0.02	2.21								
"	215-220	0.005	0.59								
"	220-225	0.005	0.24								
"	225-230	0.01	0.49								
"	230-235	0.025	0.53								
"	235-240	0.005	0.20								
"	240-245	0.005	0.21								

CERT. # 3-13

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE Date Mar. 18, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-6	245-250	0.015	0.27								
"	250-255	0.025	1.39								
"	255-260	0.01	0.56								
"	260-265	0.005	0.18								
"											

CERT. # 3-14

CHARGES $14.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-7	10-15	trace	0.05								
"	15-20	trace	0.02								
"	20-25	0.005	0.17								
"	25-30	0.01	0.21								
"	30-35	0.005	0.14								
"	35-40	0.005	0.18								
"	40-45	0.005	0.18								
"	45-50	0.005	0.11								
"	50-55	0.005	0.10								
"	55-60	0.01	0.22								

CERT. # 3-15

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-7	60-65	0.01	0.19								
"	65-70	0.005	0.11								
"	70-75	0.005	0.07								
A-8	0-10	0.02	0.14								
"	10-15	0.01	0.39								
"	15-20	0.005	0.22								
"	20-25	0.005	0.35								
"	25-30	0.01	0.39								
"	30-35	0.01	0.38								
"	35-40	0.005	0.27								

CERT. # 3-16

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286
PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Date Mar. 26, 1971

Name PHIL HULSE

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn
A-8	40-45	0.005	0.12			
"	45-50	trace	0.09			
"	50-55	trace	0.07			
"	55-60	0.005	0.09			
"	60-65	0.02	5.90			
"	65-70	0.01	2.07			
"	70-75	0.005	0.12			

CERT. # 3-17

CHARGES $24.50

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-9	10-15	0.01	0.60								
"	15-20	0.02	1.23								
"	20-25	0.02	0.81								
"	25-30	0.01	0.22								
"	30-35	0.01	0.31								
"	35-40	0.02	0.62								
"	40-45	0.005	0.16								
"	45-50	0.005	0.19								
"	50-55	0.005	0.25								
"	55-60	0.01	0.28								

CERT. # 3-18

CHARGES $35.00

Gary Stewart
CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-9	60-65	0.005	0.18								
"	65-70	0.01	0.46								
"	70-75	0.01	0.59								
"	75-80	trace	0.06								
"	80-85	none	0.06								
"	85-90	none	0.05								
"	90-95	none	0.02								
"	95-100	none	0.02								

CERT. # 3-19

CHARGES $28.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-10	10-15	none	0.02								
"	15-20	none	0.02								
"	20-25	none	0.01								
"	25-30	none	0.03								
"	30-35	none	0.03								
"	35-40	none	0.02								
"	40-45	none	0.01								
"	45-50	none	0.01								
"	50-55	none	0.02								
"	55-60	none	0.01								

CERT. # 3-20

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Date Mar. 26, 1971

Name EHIL HULSE

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-10	60-65	none	0.01								
"	65-70	none	0.01								
"	70-75	none	0.01								
"	75-80	none	0.03								
"	80-85	none	0.03								

CERT. # 3-21

CHARGES $17.50

Gary Stewart
CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSS

Date Nov. 18, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-1	225-230	0.01	0.74								
"	230-235	0.01	0.80								
"	235-240	0.02	0.77								
"	240-245	0.02	0.59								
"	245-250	0.01	0.37								
"	235-250 Fines	trace	0.22								

CERT. # 3-11

CHARGES $21.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286
PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Date MAR. 12, 1971

Name PHIL HULSE

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-1	195-200	none	0.07								
"	200-205	trace	0.14								
"	205-210	0.02	0.99								
"	210-215	0.02	2.50								
"	215-220	0.02	1.69								

CERT. # 3-2

CHARGES $17.50

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 12, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-2	0-10	0.005	0.41								
"	10-15	0.01	0.92								
"	15-20	0.01	1.20								
"	20-25	0.005	0.46								
"	25-30	0.01	0.31								
"	30-35	0.005	0.11								
"	35-40	trace	0.09								
"	40-45	trace	0.07								
"	45-50	trace	0.07								
"	50-55	none	0.02								

CERT. # 3-3

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 12, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-2	55-60	none	trace								
"	60-65	none	0.01								
"	65-70	none	trace								
"	70-75	none	trace								
"	75-80	none	trace								
"	75-80 #2	none	trace								
"	80-85	none	trace								
"	85-90	trace	0.23								
"	90-95	trace	0.06								
"	95-100	trace	0.05								

CERT. # 3-4

CHARGES $35.00

Gary Stewart
CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 13, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-3	0-10	0.01	0.24								
"	10-15	0.02	0.37								
"	15-20	0.01	0.77								
"	20-25	0.01	0.94								
"	25-30	trace	0.14								
"	30-35	trace	0.10								
"	35-40	trace	0.11								

CERT. # 3-6

CHARGES $24.50

Gary Stewart
CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 13, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-3	40-45	0.01	0.28								
"	45-50	0.01	0.51								
"	50-55	0.01	0.92								
"	55-60	0.01	0.93								
"	60-65	0.01	0.79								
"	65-70	trace	0.17								
"	70-75	none	0.05								

CERT. # 3-7

CHARGES $24.50

Gary Stewart
CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286
PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Date Mar. 13, 1971

Name PHIL HULSE

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-4	0-10	trace	0.10								
"	10-15	none	0.04								
"	15-20	0.02	0.28								
"	20-25	0.02	0.42								
"	25-30	0.02	1.17								
"	30-35	0.02	0.75								
"	35-40	0.01	0.58								
"	40-45	0.01	0.53								
"	45-50	0.01	0.42								

CERT. # 3-8

CHARGES $31.50

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 13, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-5	175-180	none	trace								
"	180-185	none	trace								
"	185-190	none	trace								
"	190-195	none	trace								
"	195-200	none	trace								
"	200-205	0.02	1.78								
"	205-210	none	trace								
"											

CERT. # 3-9

CHARGES $24.50

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 13, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-5	210-215	none	none								
"	215-220	none	none								
"	220-225	none	none								
"	225-230	none	trace								

CERT. # 3-10

CHARGES $14.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 18, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-6	150-155	0.015	1.65								
"	155-160	0.015	1.00								
"	160-165	0.01	1.04								
"	165-170	0.01	0.65								
"	165-170 #2	0.01	0.60								
"	170-175	trace	0.14								
"	175-180	trace	0.18								
"	180-185	0.015	0.36								
"	185-190	0.01	0.55								
"	190-195	0.01	0.54								

CERT. # 3-12

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 18, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-6	195-200	0.01	1.83								
"	200-205	0.01	1.09								
"	205-210	0.01	1.08								
"	210-215	0.02	2.21								
"	215-220	0.005	0.59								
"	220-225	0.005	0.24								
"	225-230	0.01	0.49								
"	230-235	0.025	0.53								
"	235-240	0.005	0.20								
"	240-245	0.005	0.21								

CERT. # 3-13

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE Date Mar. 18, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-6	245-250	0.015	0.27								
"	250-255	0.025	1.39								
"	255-260	0.01	0.56								
"	260-265	0.005	0.18								
"											

CERT. # 3-14

CHARGES $14.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-7	10-15	trace	0.05								
"	15-20	trace	0.02								
"	20-25	0.005	0.17								
"	25-30	0.01	0.21								
"	30-35	0.005	0.14								
"	35-40	0.005	0.18								
"	40-45	0.005	0.18								
"	45-50	0.005	0.11								
"	50-55	0.005	0.10								
"	55-60	0.01	0.22								

CERT. # 3-15

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-7	60-65	0.01	0.19								
"	65-70	0.005	0.11								
"	70-75	0.005	0.07								
A-8	0-10	0.02	0.14								
"	10-15	0.01	0.39								
"	15-20	0.005	0.22								
"	20-25	0.005	0.35								
"	25-30	0.01	0.39								
"	30-35	0.01	0.38								
"	35-40	0.005	0.27								

CERT. # 3-16

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286
PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Date Mar. 26, 1971

Name PHIL HULSE

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-8	40-45	0.005	0.12								
"	45-50	trace	0.09								
"	50-55	trace	0.07								
"	55-60	0.005	0.09								
"	60-65	0.02	5.90								
"	65-70	0.01	2.07								
"	70-75	0.005	0.12								

CERT. # 3-17

CHARGES $24.50

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-9	10-15	0.01	0.60								
"	15-20	0.02	1.23								
"	20-25	0.02	0.81								
"	25-30	0.01	0.22								
"	30-35	0.01	0.31								
"	35-40	0.02	0.62								
"	40-45	0.005	0.16								
"	45-50	0.005	0.19								
"	50-55	0.005	0.25								
"	55-60	0.01	0.28								

CERT. # 3-18

CHARGES $35.00

Gary Stewart
CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-9	60-65	0.005	0.18								
"	65-70	0.01	0.46								
"	70-75	0.01	0.59								
"	75-80	trace	0.06								
"	80-85	none	0.06								
"	85-90	none	0.05								
"	90-95	none	0.02								
"	95-100	none	0.02								

CERT. # 3-19

CHARGES $28.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Name PHIL HULSE

Date Mar. 26, 1971

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-10	10-15	none	0.02								
"	15-20	none	0.02								
"	20-25	none	0.01								
"	25-30	none	0.03								
"	30-35	none	0.03								
"	35-40	none	0.02								
"	40-45	none	0.01								
"	45-50	none	0.01								
"	50-55	none	0.02								
"	55-60	none	0.01								

CERT. # 3-20

CHARGES $35.00

CHEMIST

WHITE PINE ASSAY CO.

P. O. BOX 286 PHONE 289-2803
EAST ELY, NEVADA 89315

CERTIFICATE OF ASSAY

Date Mar. 26, 1971

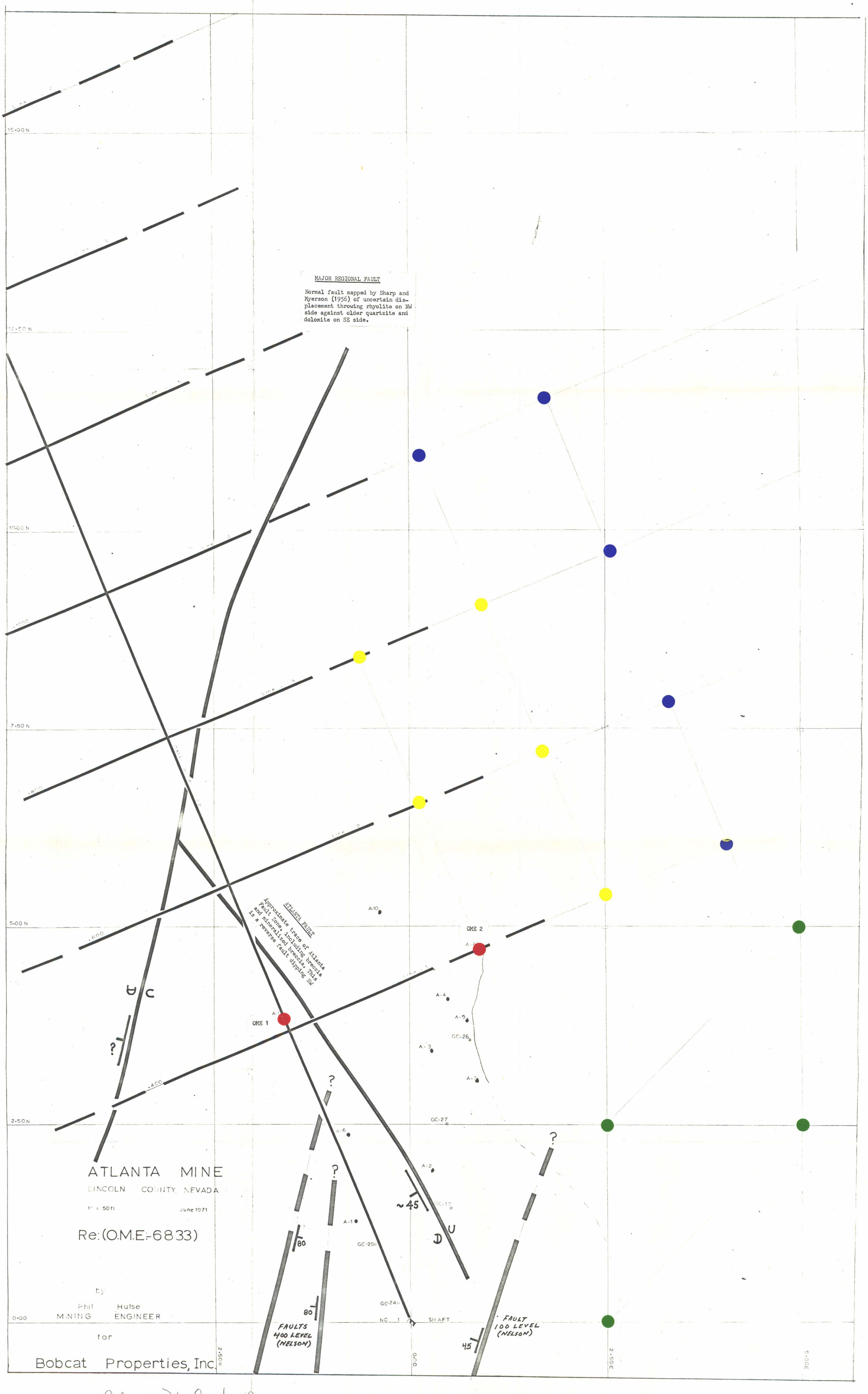
Name PHIL HULSE

SAMPLE		oz. per ton Au	oz. per ton Ag	% Cu	% Pb	% Zn					
A-10	60-65	none	0.01								
"	65-70	none	0.01								
"	70-75	none	0.01								
"	75-80	none	0.03								
"	80-85	none	0.03								

CERT. # 3-21

CHARGES $17.50

Ray Stewart
CHEMIST



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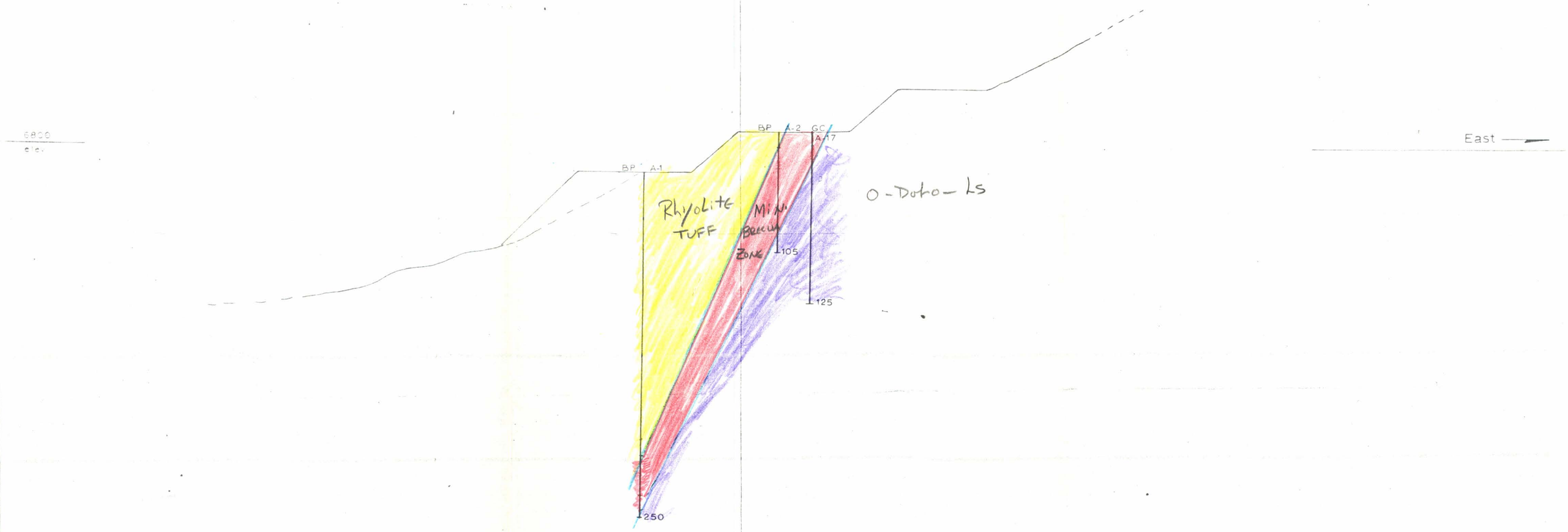


ATLANTA MINE

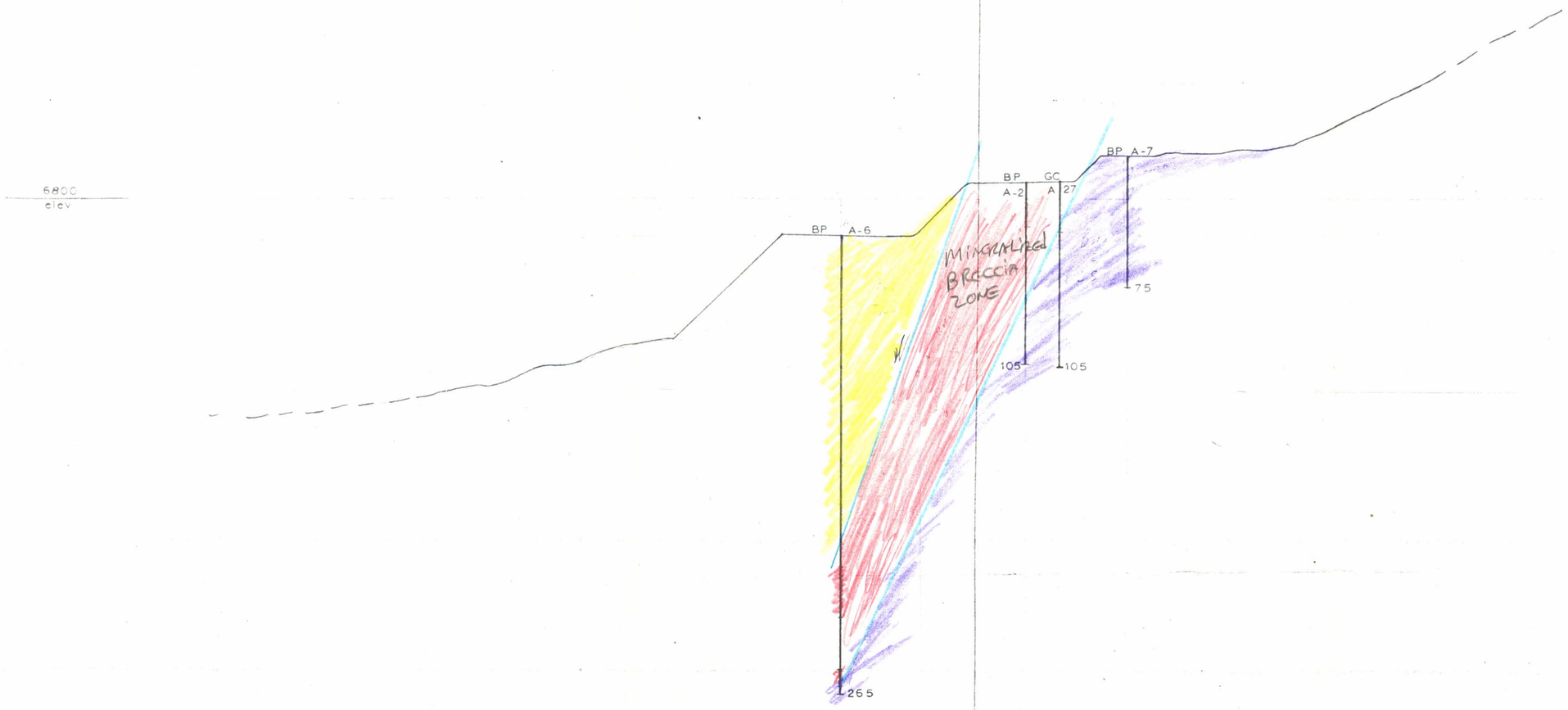
Section 1+50N

Looking North

1" = 50' April 1971

Phil Hulse

2+50W 0+00 2+50E



ATLANTA MINE

Looking North

Section 2+50N

[redacted]

1" = 50'

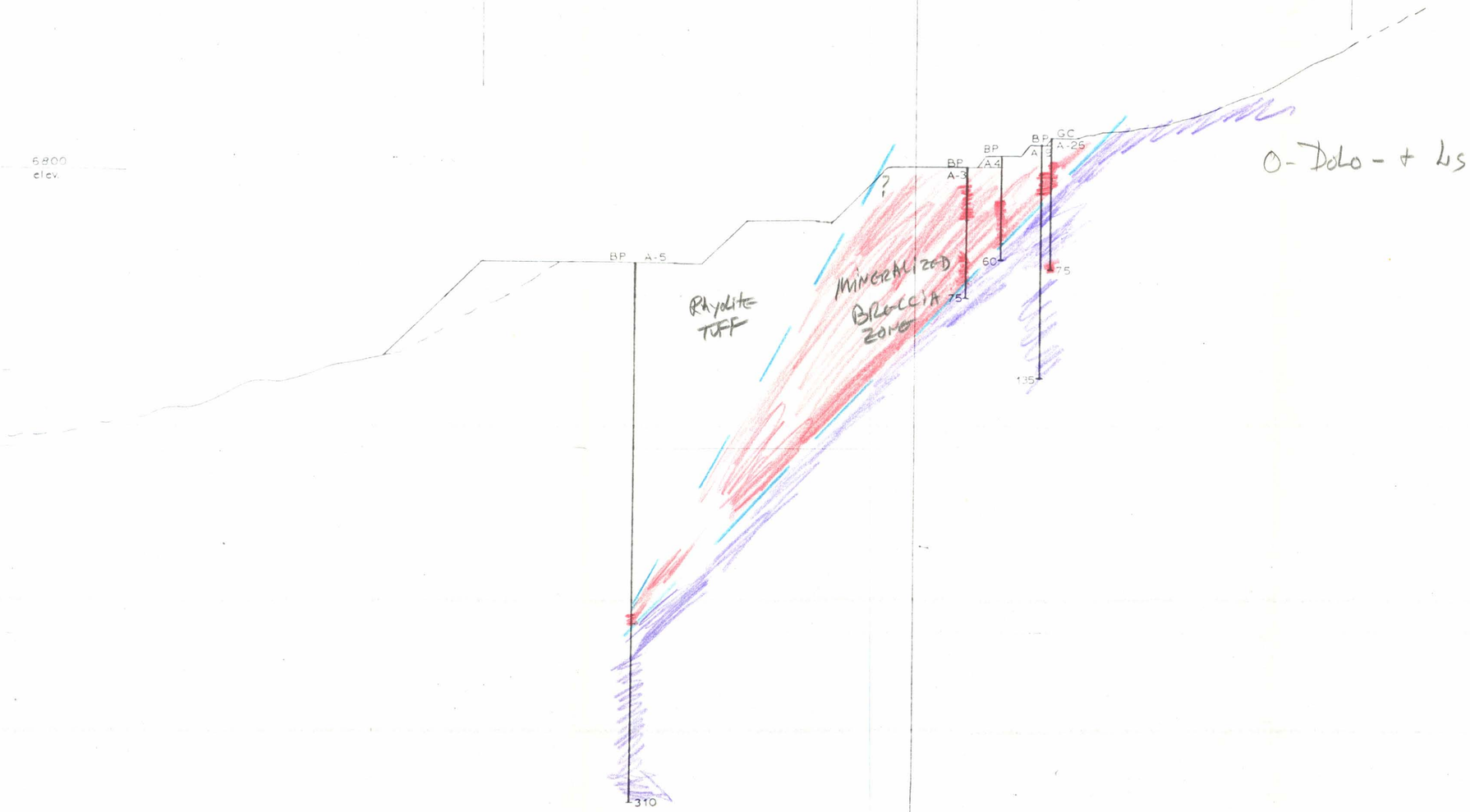
April 1971

Phil Hulse

2+50W

0+00

2+50E



ATLANTA MINE

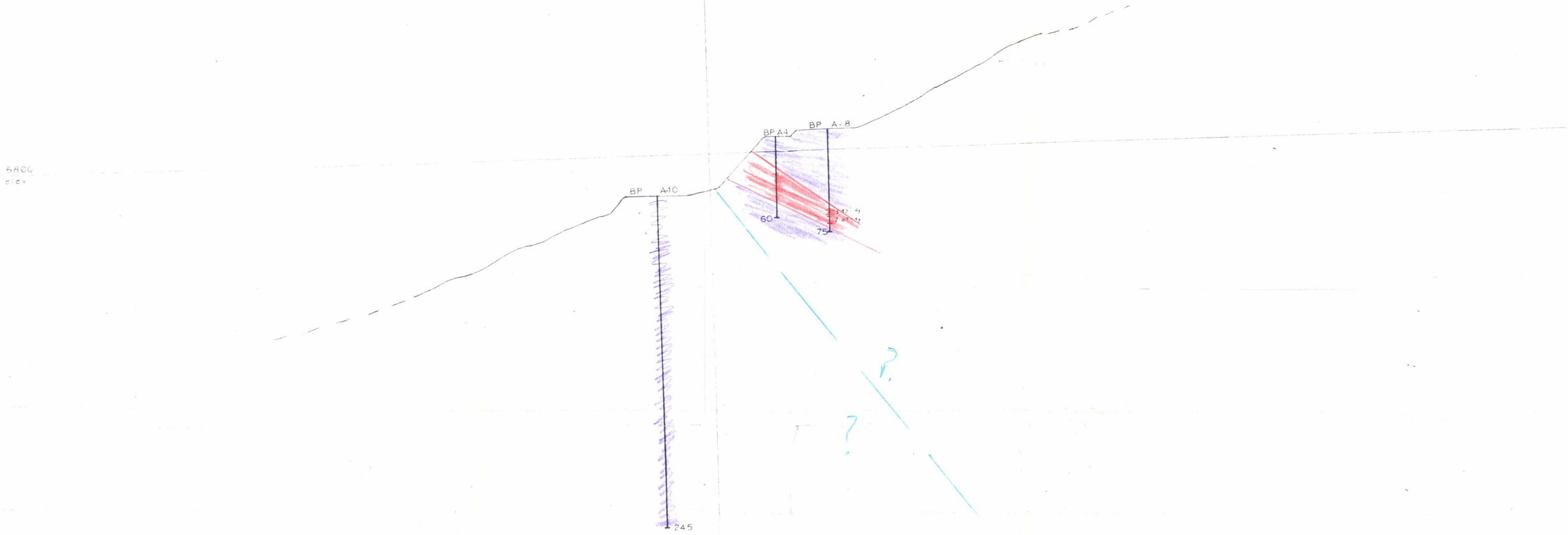
Looking North

Section 3+50N

1" = 50' April 1971

Phil Hulse

2+50W 0+00 2+50E



ATLANTA MINE
Section 5+00N

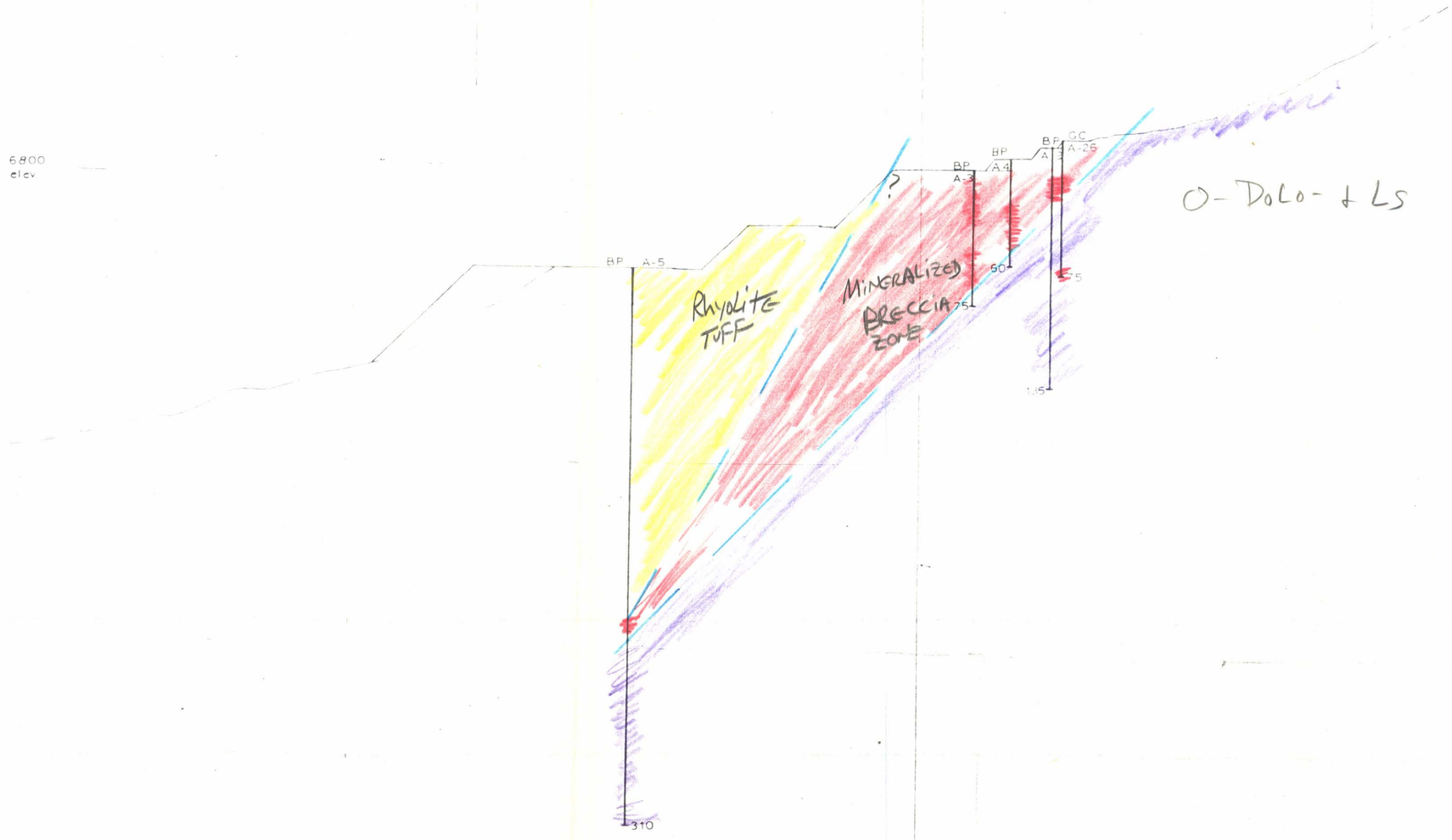
[redacted]

Looking North

1" = 50' April 1971

Phil Hulse

5-W 0-00 2-50 E



ATLANTA MINE

Looking North

Section 3+50N

1" = 50' April 1971

Phil Hulse

2+50W

0+00

2+50E

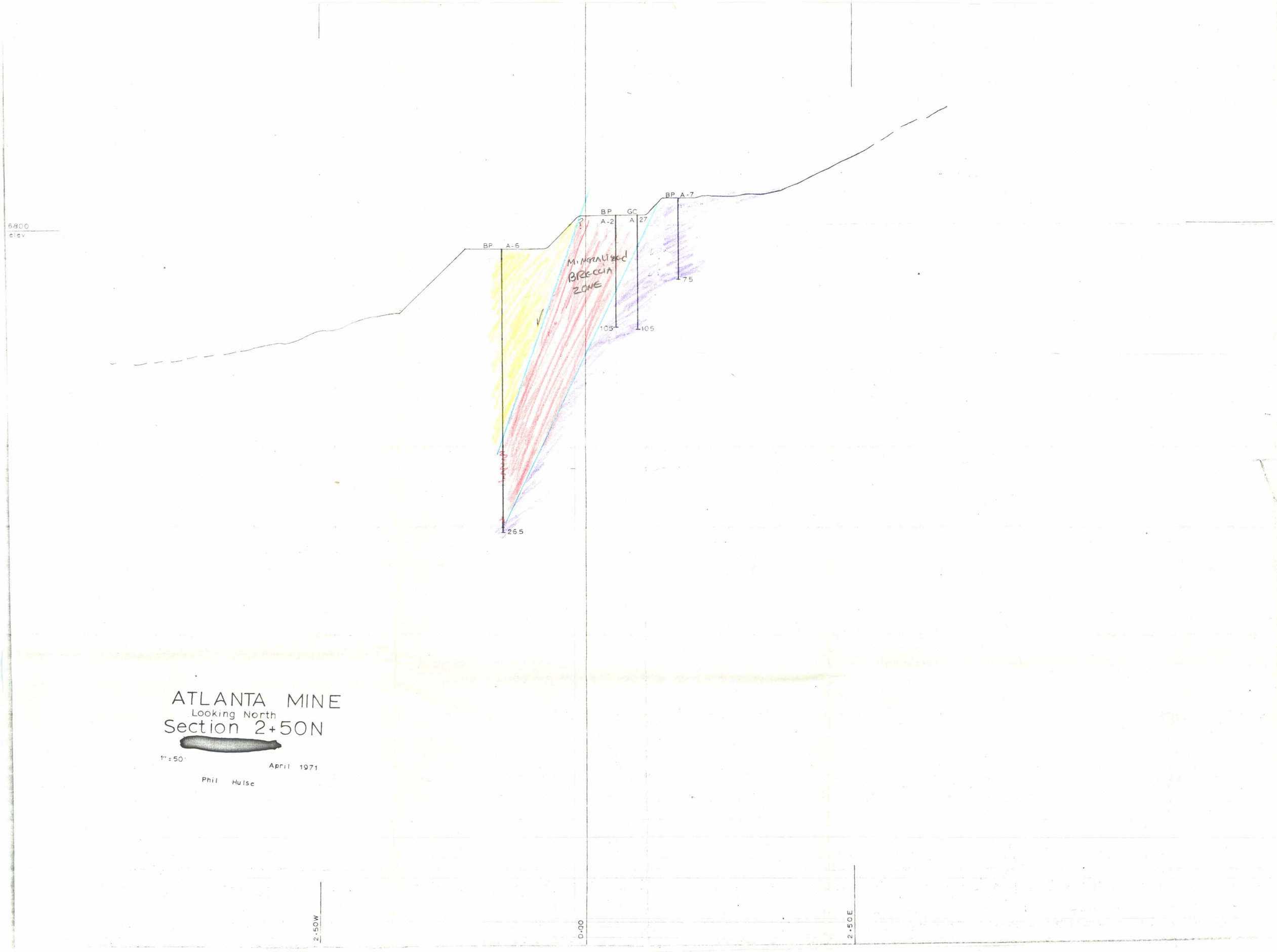
ATLANTA MINE

Section 1+50N

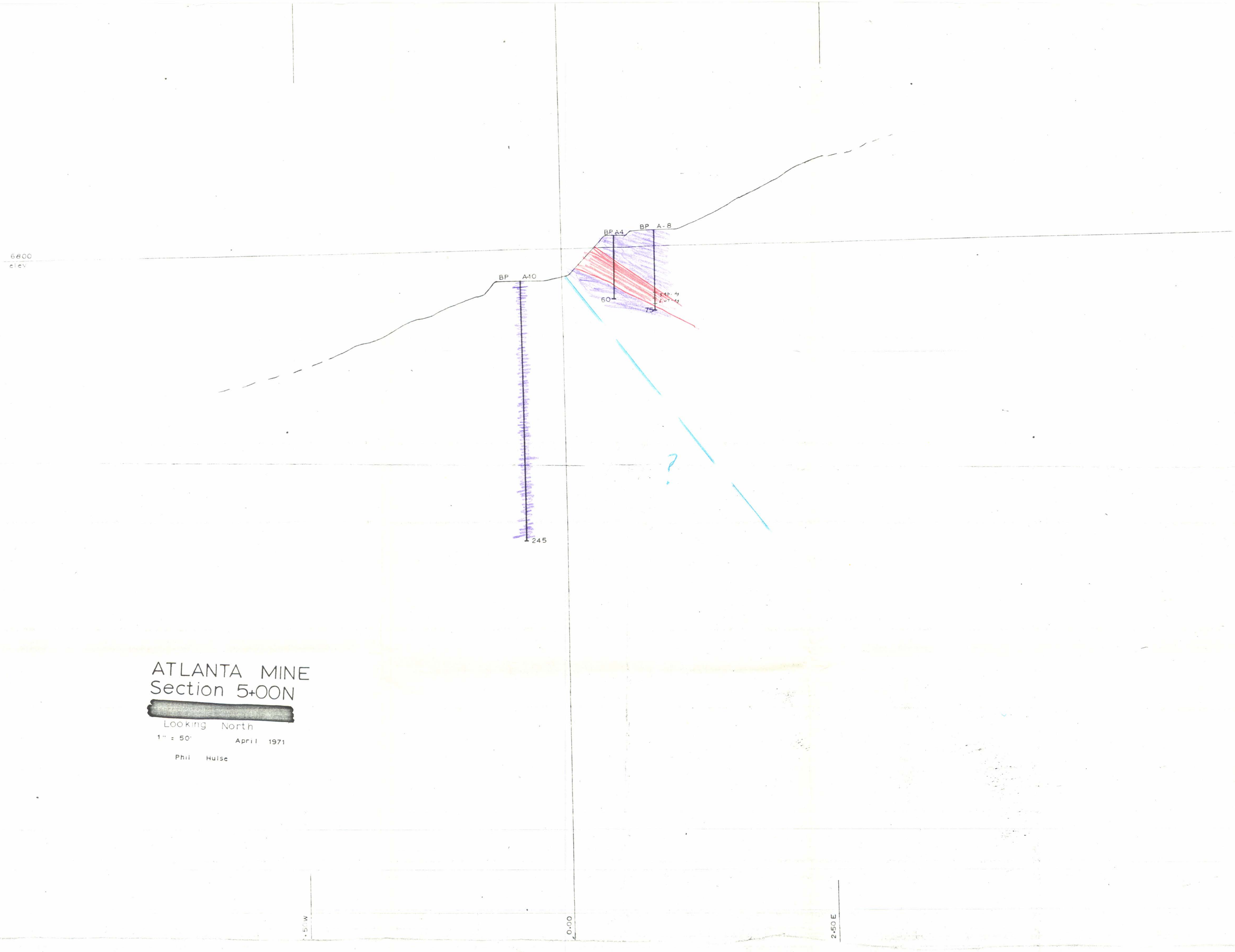
Looking North

1" = 50' April 1971

Phil Hulse



ATLANTA MINE
Looking North
Section 2+50N
[redacted]
1" = 50'
April 1971
Phil Hulse


6800
elev
BP A-10
BP A4
BP A-8
60
75
245
?
ATLANTA MINE
Section 5+00N
[redacted]
Looking North
1" = 50'
April 1971
Phil Hulse
5.00 W
0.00
2.50 E

DRILL HOLE LOG

NAME of PROPERTY ATLANTA File No

HOLE No. BPA-1

ANGLE Vertical BEARING

Collar Elevation 6782.5
Bottom Elevation

DEPTH
Overburden 195 - LAVA
Bedrock
Total Depth 250'

SCALE 1" = 20'

Date Started 2-24-71
Completed 3-3-71

LOCATION
STATE Nevada
COUNTY Lincoln
MINING DISTRICT Atlanta - Silver park
Section T R

Driller Amberson - Hugh Robinson Type of Rig C.P. 750 psi Type of Bit(s) Rotary To-195 Button 195-250

CASING RECORD

CEMENT RECORD

REMARKS

Lithology	DESCRIPTION	ASSAY Au	ASSAY Ag
Tertiary Volcanics			
	225-230	—	0.07
		Tr	0.14
		0.02	0.99
		0.02	2.50
		0.02	1.67
		0.01	0.74
		0.01	0.80
		0.02	0.77
		0.02	0.59
		0.01	0.22

205
30'
235

Non Void - No Sample

Note:
Refer To:
GC: HDH A-25
HDH A-24
For Correlation
also BP-A-6
BH

DRILL HOLE LOG

NAME of PROPERTY ATLANTA File No

HOLE No. BP-A-2

ANGLE Vertical BEARING

Collar Elevation 6809.2

Bottom Elevation

DEPTH

Overburden

Bedrock

Total Depth 105 ft SCALE 1" = 5'

Date Started

Completed

LOCATION

STATE Nevada

COUNTY LINCOLN

MINING DISTRICT ATLANTA-SILVER Park

Section T R

Driller AMBERSON-Hugh Robinson Type of Rig C.P. 750 PSI Type of Bit(s) Button

CASING RECORD

CEMENT RECORD

REMARKS

Lithology	DESCRIPTION	ASSAY Au	Ag	1	2	3	Ag
0							
5							
10		0.005	0.41				
15		0.01	0.92				
20		001	1.20				
25		0.005	0.46				
30		0.01	0.31				
35		0.005	0.11				
40		Tr	0.09				
45		Tr	0.09				
50		Tr	0.09				
55		–	0.02				
60		–	Tr				
65		–	0.01				
70		–	Tr				
75		–	Tr				
80		–	Tr				
85		–	Tr				
90		Tr	0.23				
95		Tr	0.06				
100		Tr	0.05				
105							

Refer To
GC HDH A-27
HDH A-17
For Correlation
PH

DRILL HOLE LOG

NAME of PROJECT: ATLANTA

HOLE No: BP-A-3

ANGLE: vertical BEARING:

Collar Elevation: 6805±

Collar Elevation:

DEPTH

Overburden:

Bedrock:

Total Depth: 75'

SCALE: 1" = 5 ft

Date Started: 3-4-71

Completed: 3-5-71

Driller: Amberson Hugh Robinson

Type of Drill: C.P. 250 psi

Type of Bit(s): Button

STATE: Nevada

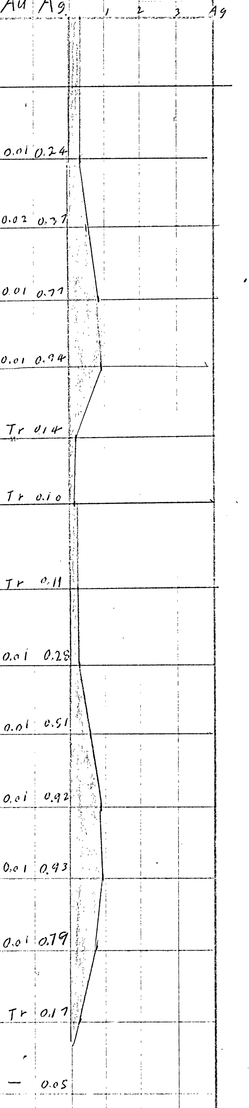
COUNTY: LINCOLN

PROPERTY: ATLANTA - Silver Park

COORDINATES:

COMMENTS:

Lithology	DESCRIPTION	ASSAY Au	ASSAY Ag
5			
10		0.01	0.24
15		0.02	0.37
20		0.01	0.77
25		0.01	0.94
30		Tr	0.14
35		Tr	0.10
40		Tr	0.11
45		0.01	0.28
50		0.01	0.51
55		0.01	0.92
60		0.01	0.93
65		0.01	0.79
70		Tr	0.17
75		—	0.05



DRILL HOLE LOG

NAME of PROPERTY ATLANTA File No.

HOLE No. BP A-4

ANGLE BEARING

Collar Elevation 6811.9

Bottom Elevation

DEPTH

Overburden

Bedrock

Total Depth 60 FC

SCALE 1" = 5'

Date Started 3-5-71

Completed 3-7-71

LOCATION

STATE Nevada

COUNTY Lincoln

MINING DISTRICT ATLANTA - Silver Park

Section T R

Driller Amberson - Hugh Robinson Type of C.P. 750 PSI Type of Bit(s) Button

CASING RECORD

CEMENT RECORD

REMARKS

Lithology	DESCRIPTION	ASSAY Au	ASSAY Ag
5			
10		Tr	0.10
15		—	0.04
20		0.02	0.28
25		0.02	0.42
30		0.02	1.17
35		0.02	0.75
40		0.01	0.58
45		0.01	0.53
50		0.01	0.42
55			
60			
65			

DRILL HOLE LOG

NAME of PROPERTY ATLANTA File No _____

HOLE No. BP-A 5

ANGLE Vertical BEARING _____

Collar Elevation 6746±

Bottom Elevation _____

DEPTH

Overburden _____

Bedrock _____

Total Depth 310 ft

SCALE 1" = 20'

Date Started 3-7-71

Completed 3-8-71

LOCATION

STATE Nevada

COUNTY Lincoln

MINING DISTRICT Atlanta-Silver Park

Section ____ T ____ R ____

Driller AMBERSON-Hugh Robinson Type of Rig C.P. 250 Psi Type of Bit(s) Rotary-175 To Button-175-310

CASING RECORD _____

CEMENT RECORD _____

REMARKS _____

Lithology	DESCRIPTION	ASSAY Au	ASSAY Ag				
20							
40							
60							
80							
100							
120							
140							
160							
180		–	Tr				
200		–	Tr				
	(200-205)	0.02	1.78				
220		–	Tr				
		–	–				
240			Tr				
		–	–				
260		–	–				
280							
300							
320							

DRILL HOLE LOG

NAME of PROPERTY ATLANTA File No.

HOLE No. BP - A - 6

ANGLE Vertical BEARING

Collar Elevation 6779.2

Bottom Elevation

DEPTH

Overburden

Bedrock

Total Depth 265'

SCALE 1" = 20'

Date Started 3-9-71

Completed 3-15-71

LOCATION

STATE Nevada

COUNTY Lincoln

MINING DISTRICT ATLANTA - Silver Park

Section T R

Driller AMBERSON-Hugh Robinson Type of Rig C.P. 250 PSI Type of Bit(s) Rotary - 195 Button - 195-265

CASING RECORD

CEMENT RECORD

REMARKS

Lithology	DESCRIPTION	ASSAY Au	Ag	1	2	3	AS
20							
40							
60							
80							
100							
120							
140							
160							
180							
200		0.01	1.83				
		0.01	1.09				
		0.01	1.08				
220		0.02	2.21				
		0.005	0.59				
		0.005	0.24				
		0.01	0.49				
240		0.025	0.53				
		0.02	0.20				
		0.005	0.21				
		0.015	0.27				
260		0.025	1.39				
		0.01	0.56				
		0.005	0.18				
280							

DRILL HOLE LOG

NAME of PROPERTY ATLANTA

File No _____

HOLE No. BP-A-7

ANGLE Vertical BEARING _____

Collar Elevation 6825.6

Bottom Elevation _____

DEPTH

Overburden _____

Bedrock _____

Total Depth 75'

SCALE 1" = 5'

Date Started 3-16-71

Completed 3-16-71

LOCATION

STATE Nevada

COUNTY Lincoln

MINING DISTRICT Atlanta - Silver Park

Section _____ T _____ R _____

Driller Amberson - Hugh Robinson Type of Rig C.P. 250 PSI Type of Bit(s) Button

CASING RECORD

CEMENT REPORT

REMARKS

Lithology	DESCRIPTION	ASSAY Au	ASSAY Ag			
5						
10						
15		TR	0.05			
20		TR	0.02			
25		0.005	0.11			
30		0.01	0.21			
35		0.005	0.14			
40		0.005	0.18			
45		0.005	0.18			
50		0.005	0.11			
55		0.005	0.10			
60		0.01	0.22			
65		0.01	0.19			
75		0.005	0.11			
		0.005	0.07			

DRILL HOLE LOG

NAME of PROPERTY ATLANTA File No

HOLE No. BP-A-8

ANGLE BEARING

Collar Elevation 6843

Bottom Elevation

DEPTH

Overburden

Bedrock

Total Depth 75'

SCALE 1" = 5'

Date Started 3-16-71

Completed 3-16-71

LOCATION

STATE Nevada

COUNTY Lincoln

MINING DISTRICT ATLANTA - Silver Park

Section T R

Driller AMBERSON Hugh Robinson Type C.P. 750 psi Type of Bit(s) button

CASING RECORD

CEMENT RECORD

REMARKS

Lithology	DESCRIPTION	ASSAY Au	ASSAY Ag	1	2	3	4	5	6
5									
10		0.02	0.14						
15		0.01	0.39						
20		0.005	0.22						
25		0.005	0.35						
30		0.01	0.39						
35		0.01	0.38						
40		0.005	0.27						
45		0.005	0.12						
50		Tr	0.09						
55		Tr	0.07						
60		0.005	0.09						
65		0.02	5.90						
70		0.01	2.07						
75		0.005	0.12						

DRILL HOLE LOG

NAME of PROPERTY ATLANTA File No. _____

HOLE No. BP A-9

ANGLE Vertical BEARING _____

Collar Elevation 6818.2

Bottom Elevation _____

DEPTH

Overburden _____

Bedrock _____

Total Depth 13.5'

SCALE 1" = 5'

Date Started 3-17-71

Completed 3-17-71

LOCATION

STATE Nevada

COUNTY Lincoln

MINING DISTRICT ATLANTA-SILVER Park

Section _____ T _____ R _____

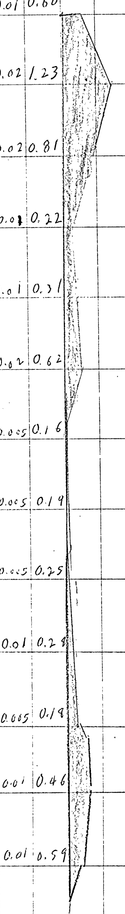
Driller Amberson - Hugh Robinson Type of Rig C.P. 250 P.S.I. Type of Bit(s) Button

CASING RECORD _____

CEMENT RECORD _____

REMARKS _____

Lithology	DESCRIPTION	ASSAY Au	ASSAY Ag
5			
10			
15		0.01	0.60
20		0.02	1.23
25		0.02	0.81
30		0.01	0.22
35		0.01	0.31
40		0.02	0.62
45		0.005	0.16
50		0.005	0.19
55		0.005	0.25
60		0.01	0.29
65		0.005	0.19
70		0.01	0.46
75		0.01	0.59
80		TR	0.06
85		—	0.06
90		—	0.05
95		—	0.02
100		—	0.02
105			
110			
115			
120			
125			
130			
135			



DRILL HOLE LOG

NAME of PROPERTY ATLANTA

File No _____

HOLE No. BP A-10

ANGLE Vertical BEARING _____

Collar Elevation 6770'

Bottom Elevation _____

DEPTH

Overburden _____

Bedrock _____

Total Depth 245'

SCALE _____

Date Started 3-18-71

Completed 3-26-71

LOCATION

STATE Nevada

COUNTY Lincoln

MINING DISTRICT Atlanta - Silver Park

Section _____ T _____ R _____

Driller Amborson Hugh Robinson

Type of Rig C.P 250 PSI

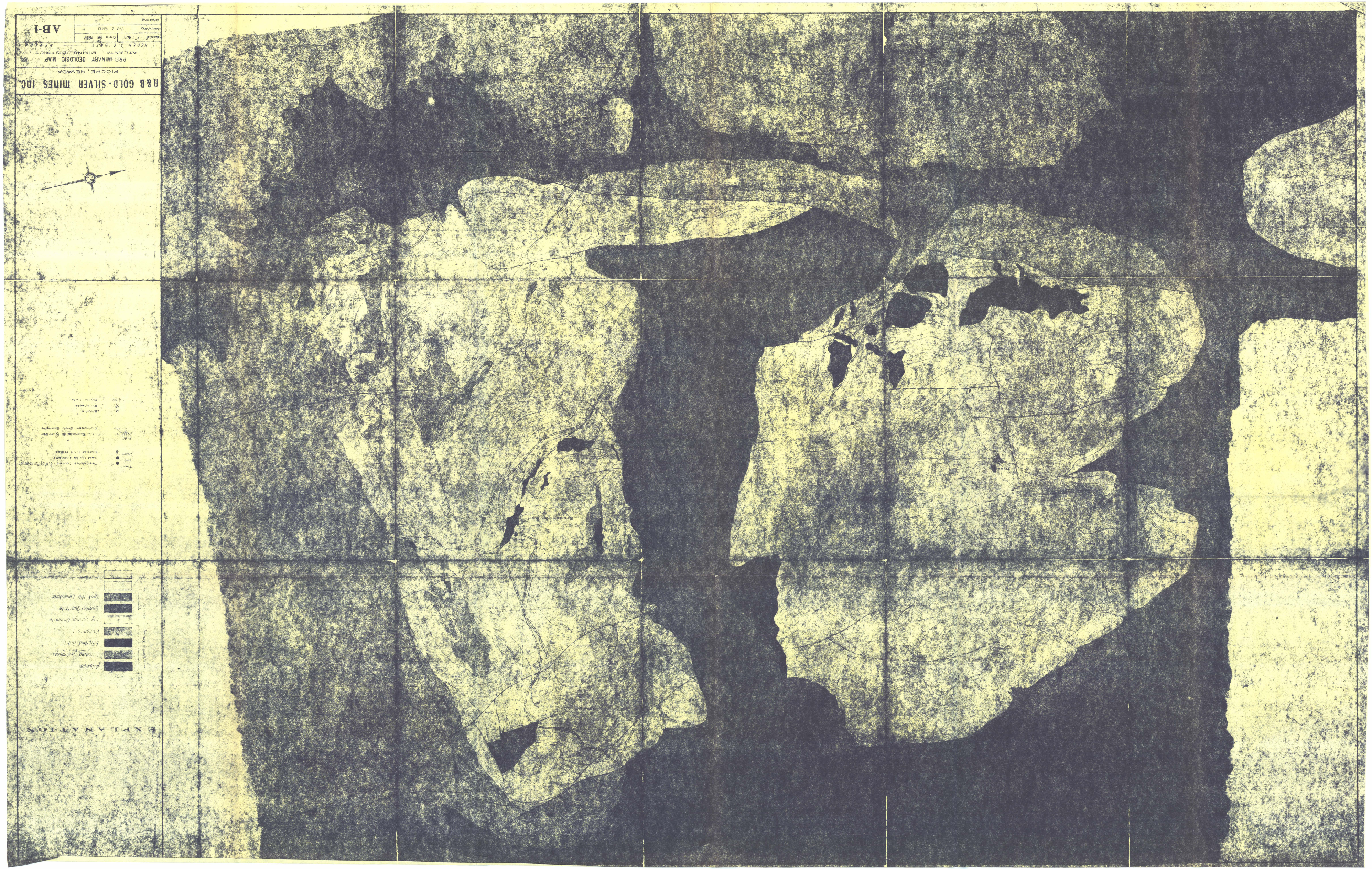
Type of Bit(s) Button

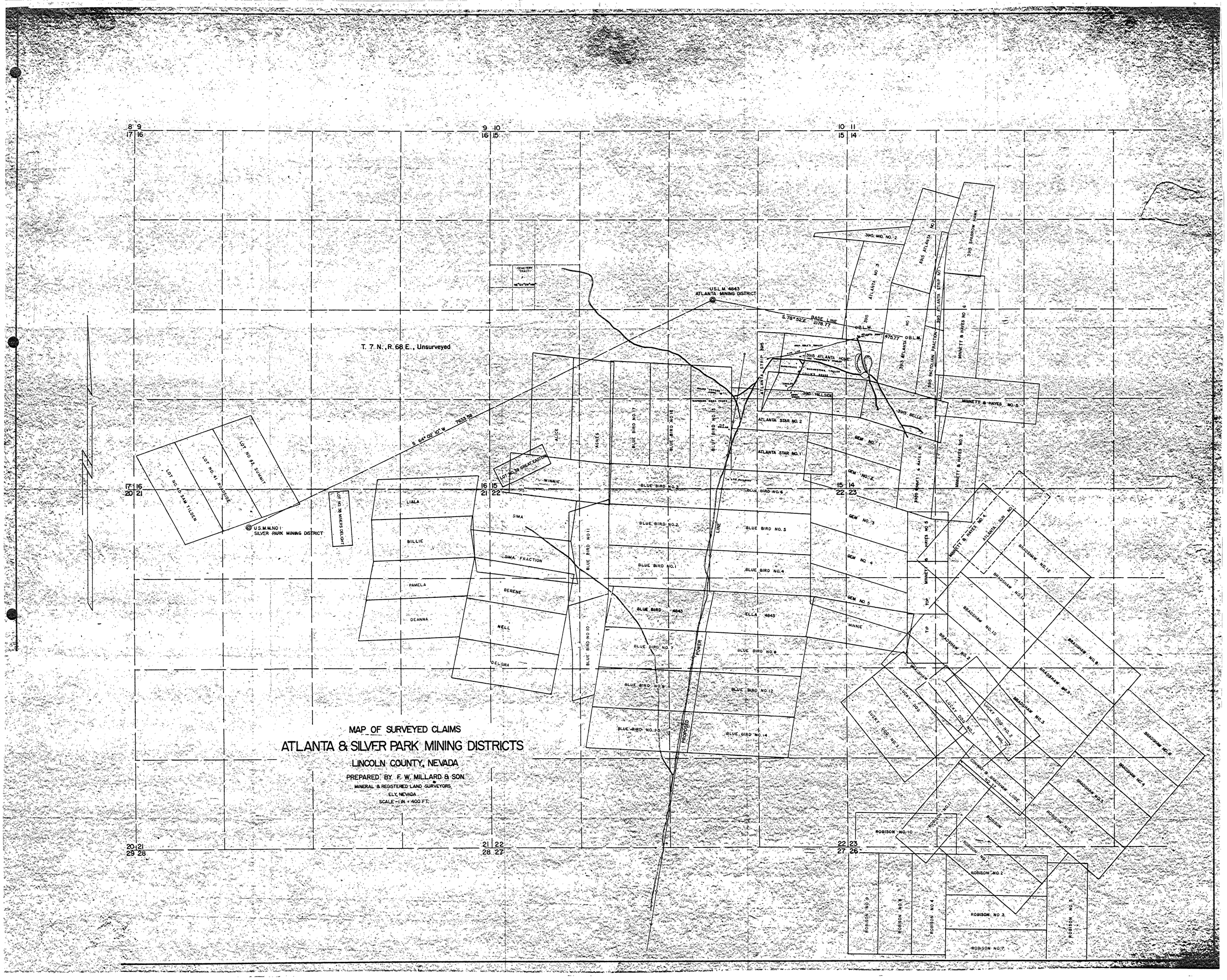
CASING RECORD _____

CEMENT RECORD _____

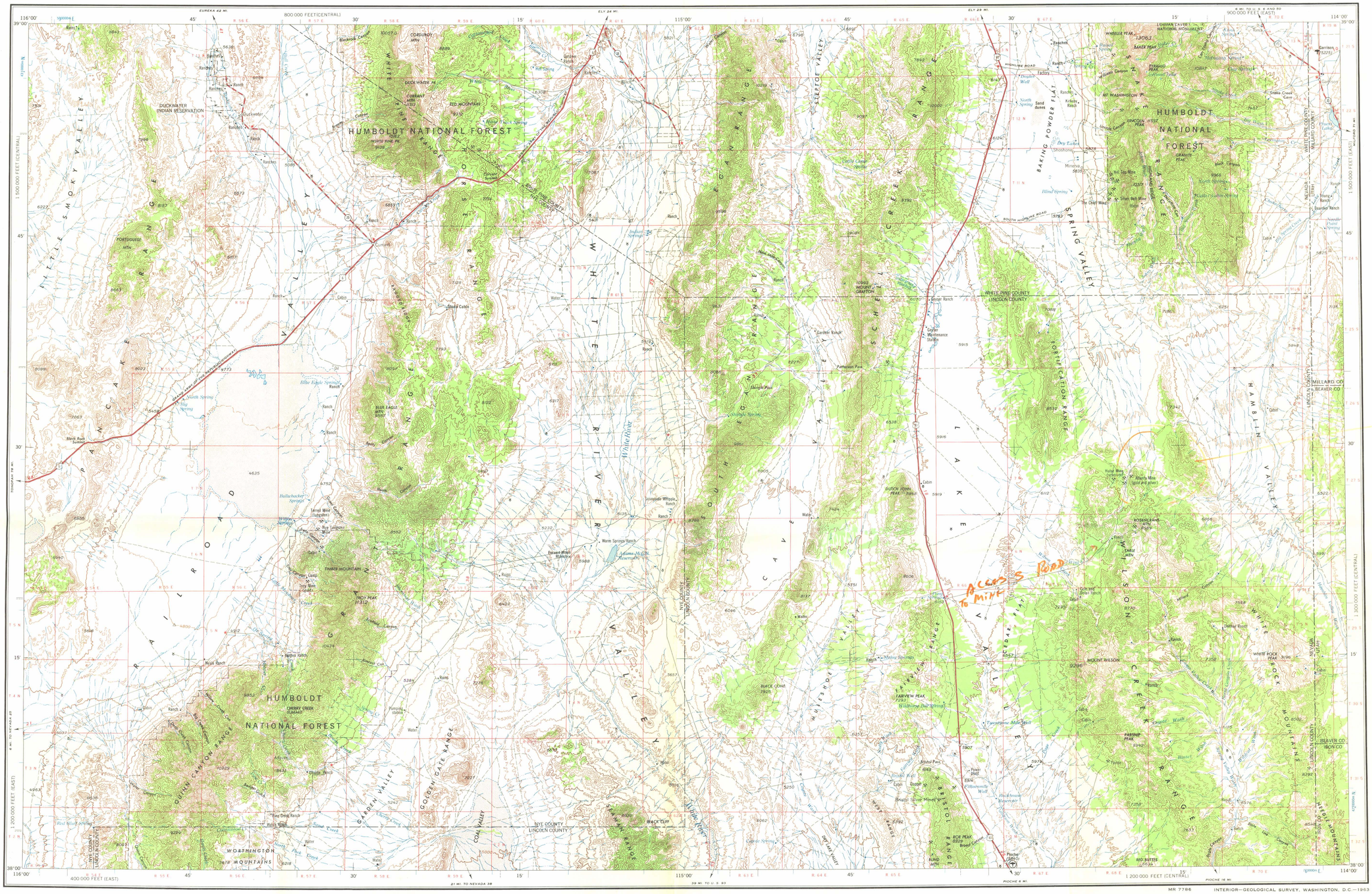
REMARKS _____

Lithology	DESCRIPTION	ASSAY
	No Significant Mineralization	
	0 - 245 No - Significant Mineralization	
	Total Depth 245'	


A & B GOLD-SILVER MINES INC.
PRELIMINARY GEOLOGIC MAP
PIOCHE, NEVADA
ATLANTA MINING DISTRICT
AB-1
EXPLANATION


MAP OF SURVEYED CLAIMS
ATLANTA & SILVER PARK MINING DISTRICTS
LINCOLN COUNTY, NEVADA
PREPARED BY F. W. MILLARD & SON
MINERAL & REGISTERED LAND SURVEYORS
ELY, NEVADA
SCALE - 1 IN. = 400 FT.
T. 7 N., R. 68 E., Unsurveyed
U.S.L.M. 4843
ATLANTA MINING DISTRICT
U.S.M.M. NO 1
SILVER PARK MINING DISTRICT
BASE LINE
S. 78° 52' E. 6176.77
S. 64° 02' 10" W. 7633.58
PROPOSED POWER LINE
CEMETERY TRACT
LOT NO. 42 SUMMIT
LOT NO. 41 RIVERSIDE
LOT NO. 40 SAM TILDEN
LOT NO. 39 GREAT EASTERN
LOT NO. 38 MINERS DELIGHT
ALICE
AGNES
WINNIE
LIALA
SIMA
SIMA FRACTION
BILLIE
PAMELA
DEANNA
BERENE
NELL
DELORA
BLUE BIRD NO. 17
BLUE BIRD NO. 16
BLUE BIRD NO. 15
BLUE BIRD NO. 11
BLUE BIRD NO. 10
BLUE BIRD NO. 3
BLUE BIRD NO. 6
BLUE BIRD NO. 2
BLUE BIRD NO. 5
BLUE BIRD NO. 1
BLUE BIRD NO. 4
BLUE BIRD 4843
ELLA 4843
BLUE BIRD NO. 7
BLUE BIRD NO. 8
BLUE BIRD NO. 9
BLUE BIRD NO. 12
BLUE BIRD NO. 13
BLUE BIRD NO. 14
ATLANTA STAR NO. 2
ATLANTA STAR NO. 1
GEM NO. 1
GEM NO. 2
GEM NO. 3
GEM NO. 4
GEM NO. 5
MINNIE
3915 MID. NO. 2
ATLANTA NO. 3
3915 ATLANTA NO. 2
3915 SPARROW HAWK
ATLANTA STRIP
3915 ATLANTA NO. 1
3915 ATLANTA HONE
3915 HILLSIDE
3915 BELLE
3915 PACTOLIAN FRACTION
MINNETT & HAYES NO. 6
MINNETT & HAYES NO. 8
MINNETT & HAYES NO. 2
MINNETT & HAYES NO. 4
MINNETT & HAYES NO. 5
TOP TIP
ATLANTA SUN NO. 1
BRADSHAW NO. 12
BRADSHAW NO. 11
BRADSHAW NO. 10
BRADSHAW NO. 2
BRADSHAW NO. 8
BRADSHAW NO. 9
BRADSHAW NO. 3
BRADSHAW NO. 6
BRADSHAW NO. 4
BRADSHAW NO. 5
LUCKY DOG
LUCKY DOG NO. 1
LUCKY DOG NO. 2
LUCKY DOG NO. 3
PHILO
CONWAY & BRADSHAW LODE
ROBISON NO. 10
ROBISON NO. 11
ROBISON
ROBISON NO. 1
ROBISON NO. 2
ROBISON NO. 3
ROBISON NO. 7
ROBISON NO. 6
ROBISON NO. 5
ROBISON NO. 4
ROBISON NO. 8
ROBISON NO. 9

LUND



Prepared by the Army Map Service (KCSX), Corps of Engineers, U.S. Army, Washington, D.C. Compiled in 1956 by photogrammetric methods. Horizontal and vertical control by USGS, USC&GS, and USCE. Aerial photography 1952-54, field annotated 1956. Limited revision by U.S. Geological Survey 1962

100,000-foot grids based on Nevada coordinate system, east and central zones

10,000-meter Universal Transverse Mercator grid ticks, zone 11, shown in blue

LEGEND

ROAD DATA 1956 PARTIALLY REVISED 1962

Figures in red denote approximate distances in miles between stars

POPULATED PLACES
- Over 500,000 — LOS ANGELES
- 100,000 to 500,000 — OMAHA
- 25,000 to 100,000 — GALVESTON
- 5,000 to 25,000 — Laramie
- 1,000 to 5,000 — Grand Coulee
- Less than 1,000 — Sun Valley

RAILROADS
- Standard gauge — Single track / Double or Multiple
- Narrow gauge

BOUNDARIES
- International
- State
- County
- Park or reservation

ROADS
- Hard surface, heavy duty — More than two lanes wide — 3 LANES | 4 LANES
- Two lanes wide; Federal route marker — 11
- Hard surface, medium duty — More than two lanes wide — 3 LANES | 4 LANES
- Two lanes wide; State route marker — 9
- Improved light duty
- Unimproved dirt
- Trail

- Landplane airport
- Landing area
- Seaplane airport
- Seaplane anchorage
- Woods-brushwood
- Landmarks: School; Church; Other
- Horizontal control point; Windmill
- Spot elevation in feet — 221
- Marsh or swamp
- Intermittent or dry stream
- Power line

Scale 1:250,000

5 0 5 10 15 20 Statute Miles

5 0 5 10 15 20 25 30 Kilometers

5 0 5 10 15 Nautical Miles

CONTOUR INTERVAL 200 FEET
WITH SUPPLEMENTARY CONTOURS AT 100 FOOT INTERVALS

TRANSVERSE MERCATOR PROJECTION

1960 MAGNETIC DECLINATION FOR THIS SHEET VARIES FROM 16°30' EASTERLY FOR THE CENTER OF THE WEST EDGE TO 16°00' EASTERLY FOR THE CENTER OF THE EAST EDGE. MEAN ANNUAL CHANGE IS 0°01' WESTERLY

FOR SALE BY U.S. GEOLOGICAL SURVEY, DENVER 25, COLORADO OR WASHINGTON 25, D.C.

LOCATION DIAGRAM FOR NJ 11-6

NK 11-10 LOVELOCK	WINNEMUCCA	ELKO	TOOELE	SALT LAKE CITY NK 12-11
NJ 11-1	NK 11-11	NK 11-12	NK 12-10	
	NEVADA NJ 11-2	NJ 11-3 ELY	NJ 12-1 DELTA	UTAH NJ 12-2
WALKER NJ 11-4	BILLETT NJ 11-5	LUND NJ 11-6	BEAVER NJ 12-4	CEDAR CITY NJ 12-5
	TONOPAH			
MARIPOSA NJ 11-7	GOLDFIELD NJ 11-8	CALIENTE NJ 11-9	LAS VEGAS NJ 12-7	ST. GEORGE NJ 12-8
CALIFORNIA				
FRESNO NJ 11-10	NJ 11-11 DEATH VALLEY	NJ 11-12 LAS VEGAS	ARIZONA NJ 12-10 GRAND CANYON	KANAB CANYON NJ 12-11

TOWNSHIP OR RANGE LINE

LAND GRANT BOUNDARY

SECTIONIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

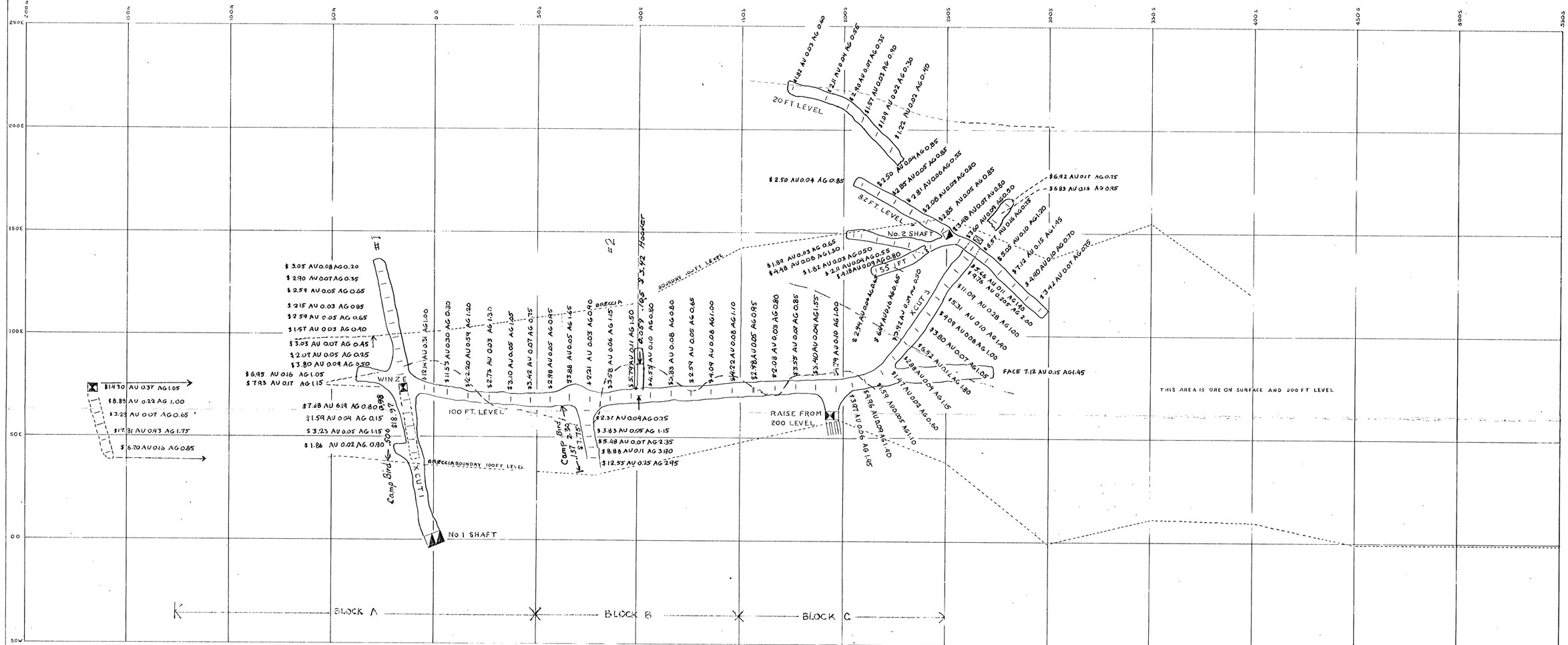
LUND, NEVADA, UTAH

1956

LIMITED REVISION 1962

MR 7786

INTERIOR—GEOLOGICAL SURVEY, WASHINGTON, D.C.—1963



[redacted]

[redacted]

[redacted]

ATLANTA MINE

LINCOLN COUNTY, NEVADA

ASSAY MAP

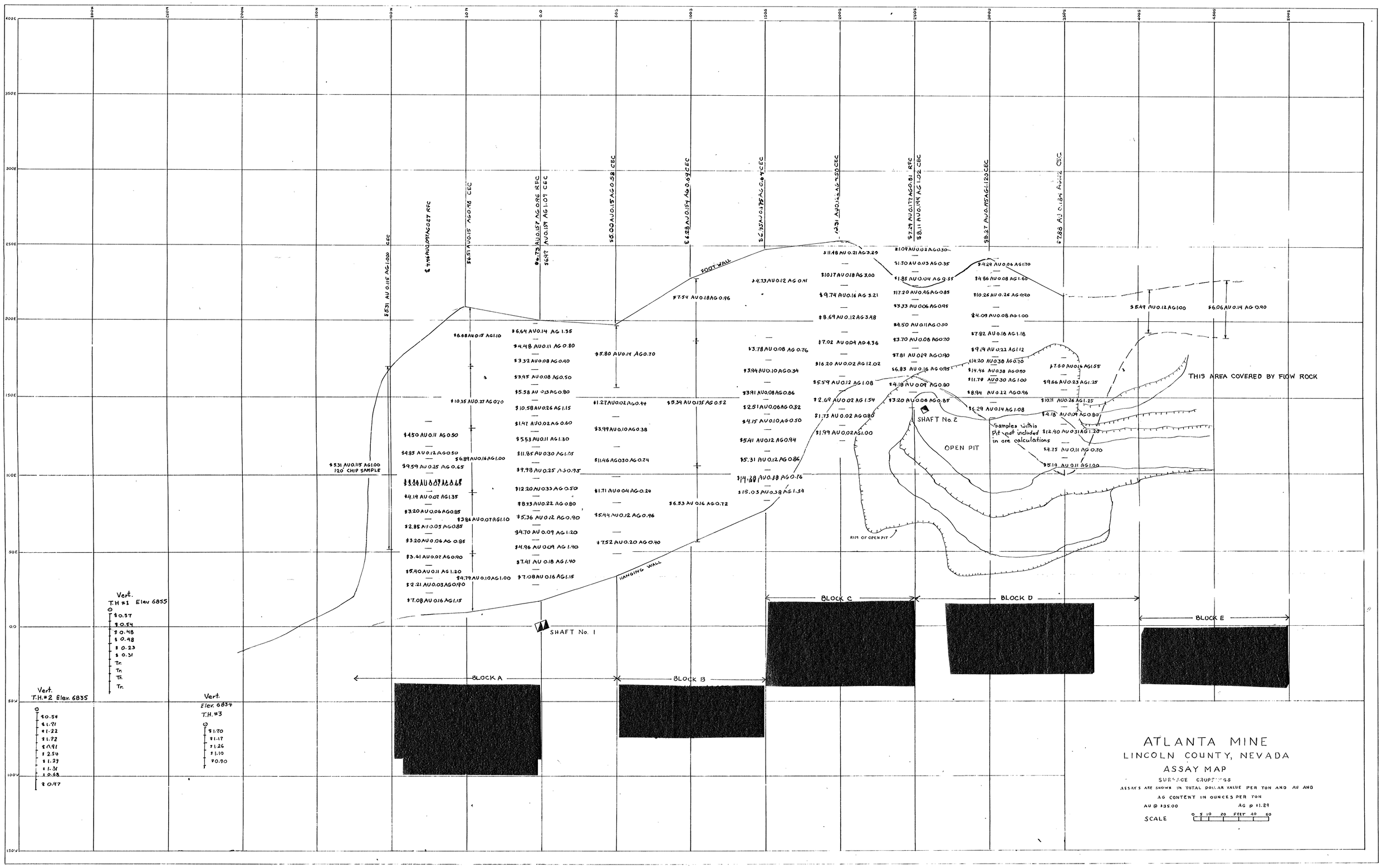
20 FT., 55 FT., 82 FT., AND 100 FT. LEVELS

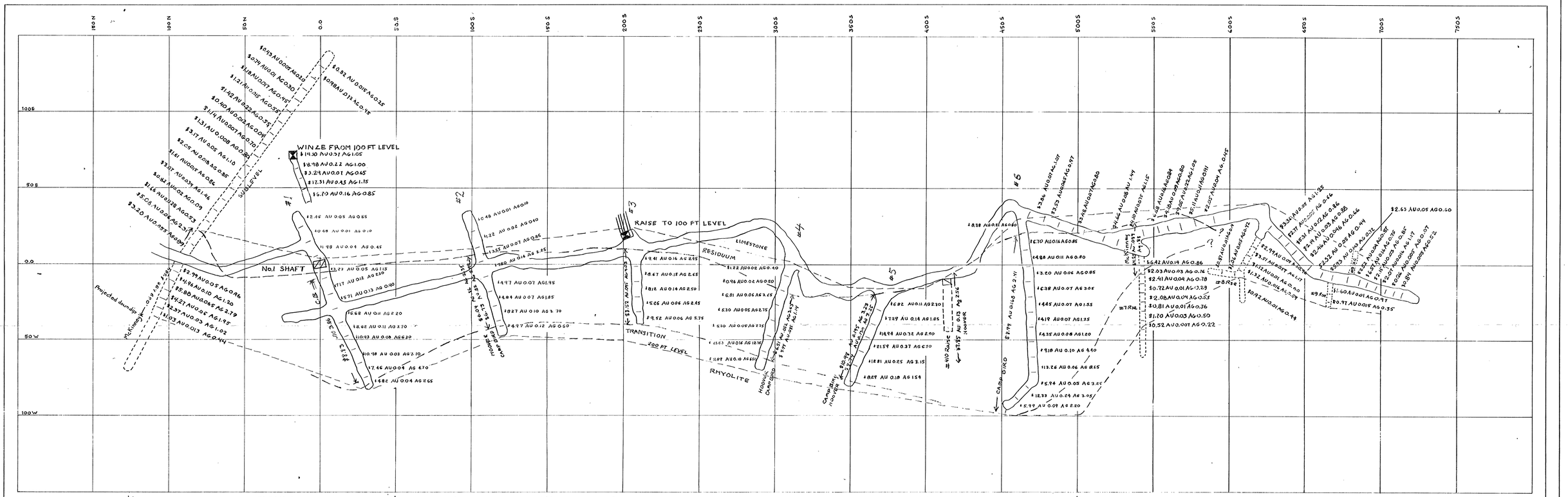
ASSAYS ARE SHOWN IN TOTAL DOLLAR VALUE PER TON

AND AU AND AG CONTENT IN OUNCES PER TON

AU @ $35.00 AG @ $1.29

SCALE 0 5 10 20 FEET 40 50


ATLANTA MINE
LINCOLN COUNTY, NEVADA
ASSAY MAP
SURFACE CROPPINGS
ASSAYS ARE SHOWN IN TOTAL DOLLAR VALUE PER TON AND AU AND AG CONTENT IN OUNCES PER TON
AU @ $35.00
AG @ $1.29
SCALE
0 5 10 20 FEET 40 50
THIS AREA COVERED BY FLOW ROCK
OPEN PIT
RIM OF OPEN PIT
SHAFT No. 1
SHAFT No. 2
FOOT WALL
HANGING WALL
BLOCK A
BLOCK B
BLOCK C
BLOCK D
BLOCK E
Samples within Pit not included in ore calculations
Vert. T.H. #1 Elev 6855
Vert. T.H. #2 Elev. 6835
Vert. Elev. 6834 T.H. #3



ATLANTA MINE

LINCOLN COUNTY, NEVADA

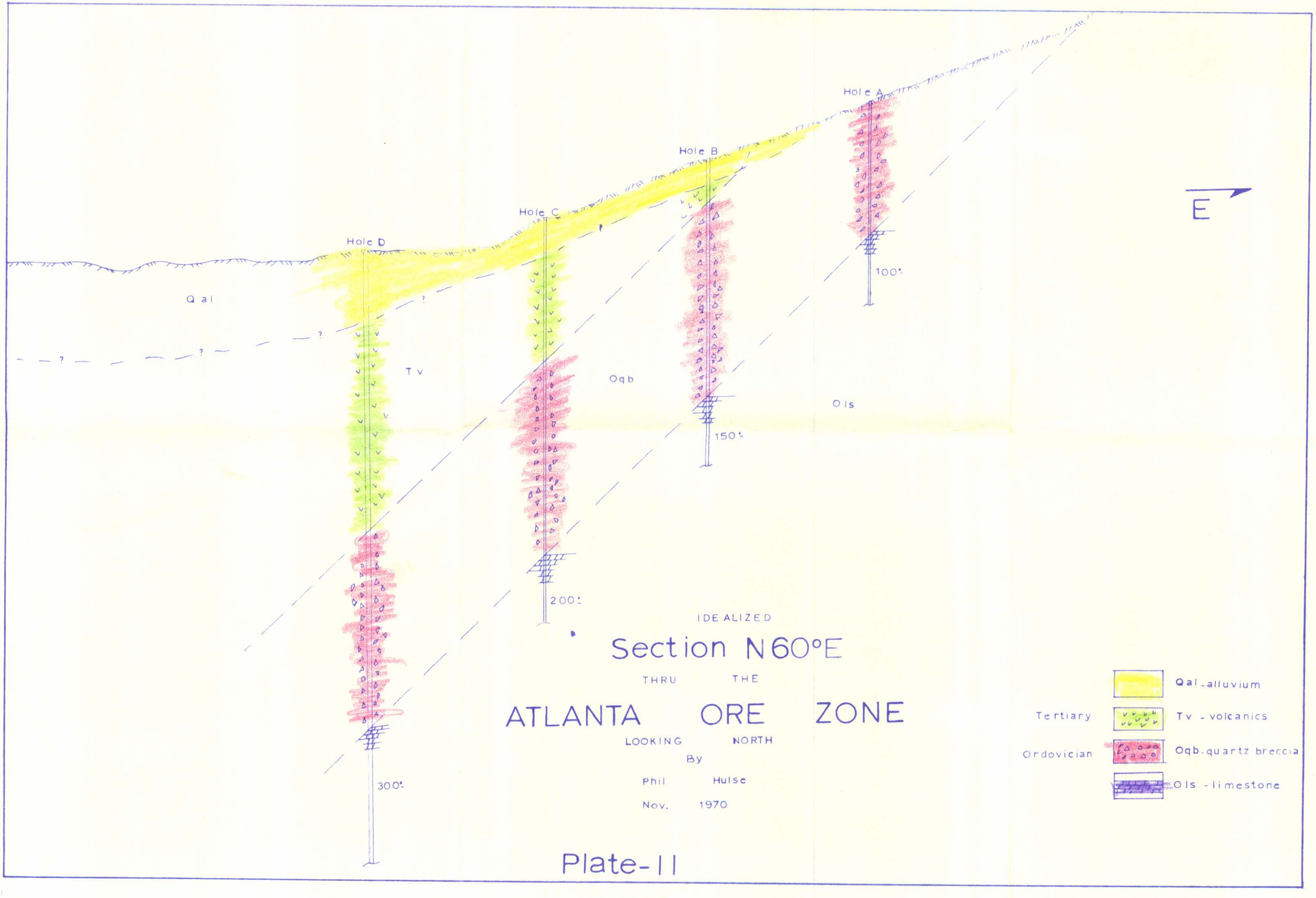
ASSAY MAP

200 FT. AND 131 FT LEVELS

ASSAYS ARE SHOWN IN TOTAL DOLLAR VALUE PER TON AND AU AND AG CONTENT IN OUNCES PER TON

AU @ $35.00 AG @ $1.29

SCALE 0 5 10 20 FEET 40 50



IDEALIZED

Section N60°E

THRU THE

ATLANTA ORE ZONE

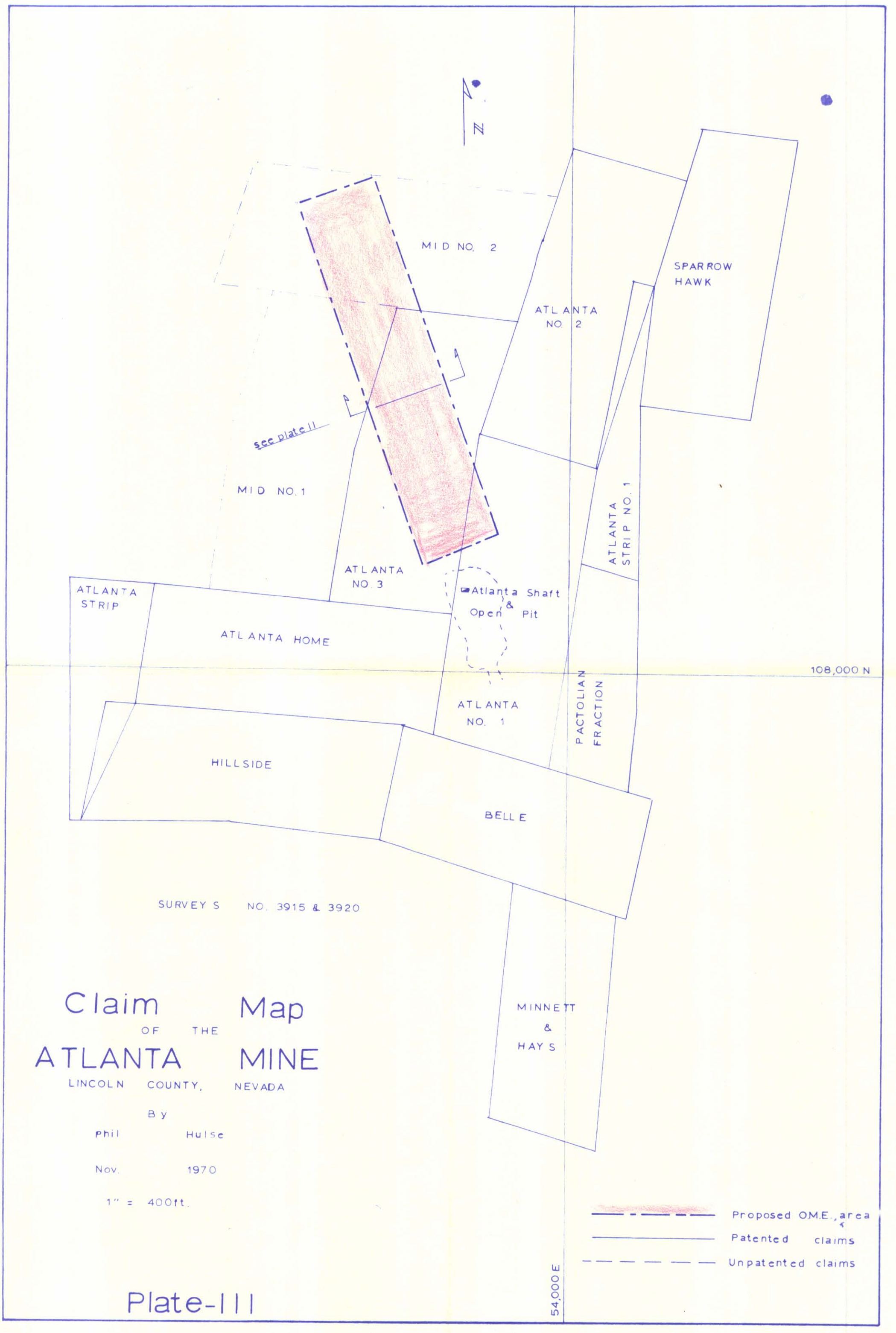
LOOKING NORTH

By

Phil Hulse

Nov. 1970

Plate-11



Claim Map OF THE ATLANTA MINE

LINCOLN COUNTY, NEVADA

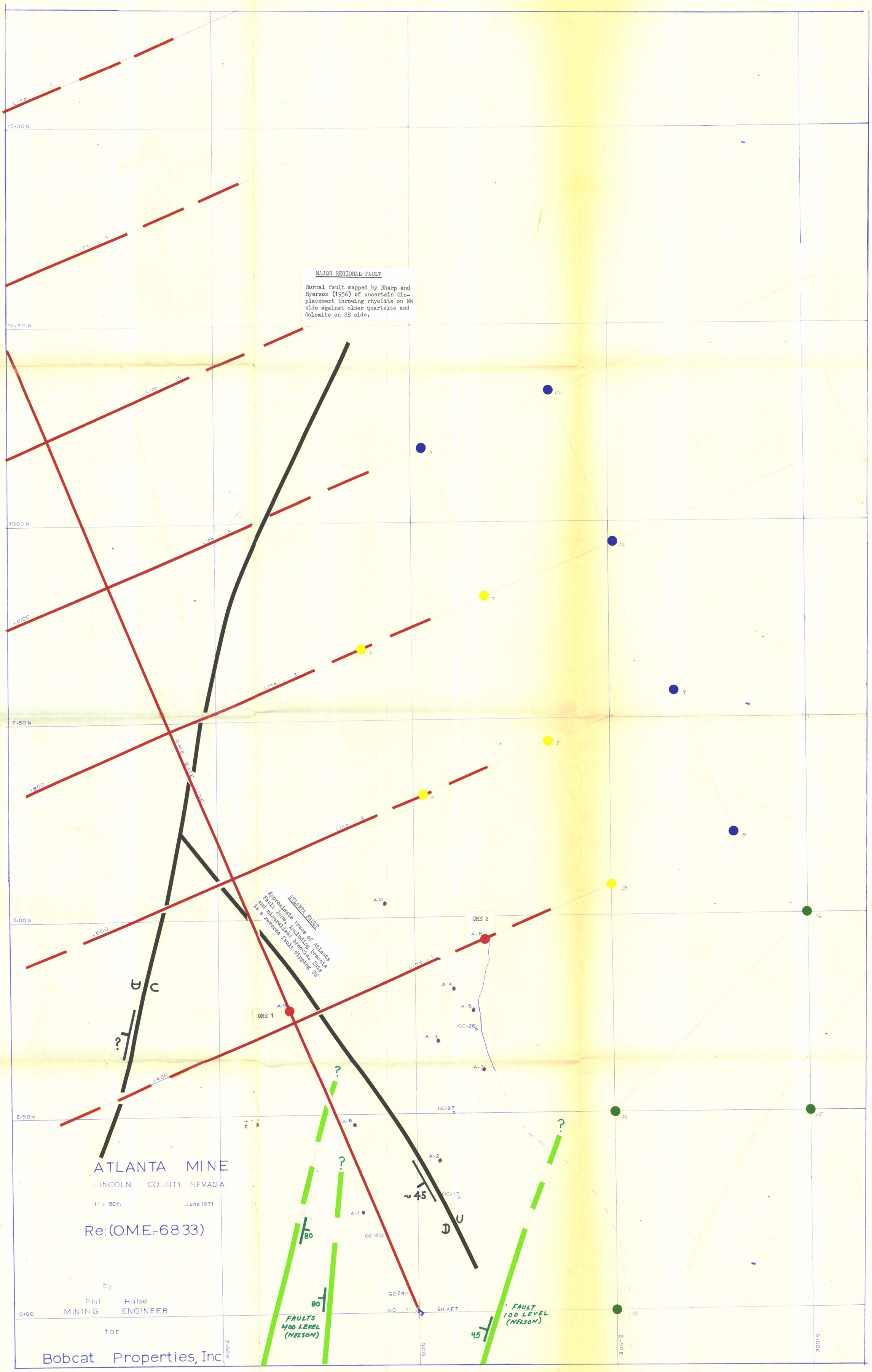
By

Phil Hulse

Nov. 1970

1" = 400ft.

Plate-III



Rec'd. June 20, 1971
see Dennis B. Olson memo